SiS964/Silicon 3112A SATA RAID User's Manual

Serial ATA
Serial ATA RAID 0 or 1
Serial ATA JBOD

User's Guide

Edition
V1.0
P/N: 91-185-755-10-00

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Introduction

The South Bridge SiS964 SATA controller support two Serial ATA on two independent ports. Specifications are as follows:

Serial ATA Interface

Serial ATA (SATA) is the latest generation of the ATA interface. SATA hard drives deliver blistering transfer speeds of up to 150MB/sec. Serial ATA uses long, thin cables, making it easier to connect your drive and improving the airflow inside your PC.

- ♦ Supports 150 MB/s transfers with CRC error checking
- ♦ Large LBA support for drives over 137 GB
- ♦ Data handling optimizations including tagged command queuing, elevator seek and packet chain command

Serial ATA RAID Interfaces

The Serial ATA RAID is designed to provide a cost-effective, high performance RAID solution that adds performance and/or reliability to PC desktops and/or servers using Serial ATA/150 hard disks.

Serial ATA RAID function supports striping (RAID 0), mirroring (RAID 1) and span (JBOD).

With striping, identical drives can read and write data in parallel to increase performance. Mirroring increases read performance through load balancing and elevator sorting while creating a complete backup of your files. Span would increase the logic hard disk space.

Serial ATA RAID striped arrays can double the sustained data transfer rate of Serial ATA/150 drives. Serial ATA RAID fully supports Serial ATA/150 specification of up to 150MB/sec per drive, depending on individual drive specifications.

The technology also offers fault tolerant, data redundancy for entry-level network file servers or simply for desktop PC users wanting to continually protect valuable data on their PC. The Serial ATA RAID offers RAID 1 mirroring (for two SATA drives) to protect data. Should a drive that is part of a mirrored array fail, Serial ATA RAID technology uses the mirrored drive (which contains identical data) to assume all data handling. When a new replacement drive is later installed, Serial ATA RAID rebuilds data to the new drive from the mirrored drive to restore fault tolerance.

Features

- The South Bridge SiS964 SATA controller only support two Serial ATA (Serial ATA RAID) drivers.
- Support RAID function: RAID 0, RAID 1 and JBOD.
- Support bootable disk.
- Windows-based SiS RAID Utility software tool (only support Windows XP and 2000).
- BIOS RAID Setting Utility.

Support operating Systems

- Microsoft Windows 2000 Professional and Server
- Microsoft Windows XP

Step 0. What is RAID

Know How

This section will give you an overview about the RAID system and introduce the basic background and glossary which you need to know before using "SiS RAID Controller Application".

1. **RAID**: (Redundant Array of Independent Disk Drives) use jointly several hard drives to increase data transfer rates and data security. It depends on the number of drives present and RAID function you select to fulfill the security or performance purposes or both.
2. **RAID 0**: Also known as "Stripping". All of the data are distributed evenly to all of the existing drives. You gain benefits on performance because the data transfer rate is multiplied by the number of drives. However, RAID 0 has high risks of data security. All of the stored data will be lost if even any one drive in the RAID set crashes.
3. **RAID 1**: Also known as "Mirroring". Two hard drives are required. The goal of RAID 1 is to ensure data security. Data is written to two or more drives synchronously. That is, 100% duplication of data from one drive to another.
4. **JBOD**: (Just a Bunch of Drives). Also known as "Spanning". Two or more hard drives are required. Several hard disk types configured as a single hard disk. The hard drives are simply hooked up in series. This expands the capacity of your drive and results in a useable total capacity. However, JBOD will not increase any performance or data security.

Performance hints and recommend setting

For the best performance and reliability, please read the following suggestions.
1. Use the same model hard drives.
2. If you have only two Serial ATA drives, the auto-configure function will assign each on a different channel as a master drive.
3. Always use 80-conductor cables.
4. We strongly recommend you should use "DMA" transfer mode.
5. The recommended block size is "64K" when creating RAID 0.

Step 1. Hardware Setup

Hard Drives setup

The South Bridge SiS964 SATA controller only supports two Serial ATA hard drivers.

For RAID 0 (Striping array)

● Any of 2 SATA Hard disks would make a stripe system.

● The South Bridge SiS964 SATA controller only supports combination 6.

NOTE: Storage Capacity: the number of hard drives times the capacity of the smallest drive in the disk array

Working Speed: the speed of the lowest drive in the disk array

For RAID 1 (Mirror array)

● Any of 2 SATA Hard disks would make a mirror system.

● The South Bridge SiS964 SATA controller only supports combination 6.

NOTE: Storage Capacity: the capacity of the smallest drive in the disk array

Working Speed: the speed of the lowest drive in the disk array

For JBOD (Spanning array)

● Any of 2 SATA Hard disks would combine to a JBOD system.

● The South Bridge SiS964 SATA controller only supports combination 6.

NOTE: Storage Capacity: the number of hard drives times the capacity of the smallest drive in the disk array

Working Speed: the speed of the lowest drive in the disk array

NOTE: Before Installing software drivers, make sure to set the item "SIS Serial ATA Mode" to **Raid** in "Integrated Peripherals" of BIOS Setup.

Step 2. Installing Software Drivers

● SiS RAID driver support Microsoft Windows XP/2000

1. South Bridge SiS964 SATA controller support Serial ATA W/ RAID0, RAID 1 and JBOD by installing SiS RAID driver. For RAID function, SIS 964 support RAID0, RAID1 and JBOD by software RAID driver.
2. ***Support the function of installing Windows Operation System to RAID array***.

For special occasions, users can refer to the following sections with details on the SiS964 driver installation when used with Windows XP/2000 operating systems.

Windows XP/2000

New Windows XP/2000 Installation

The following details the installation of the drivers while installing new Windows XP/2000.

1. Start the installation:

   Boot from the CD-ROM. Press *F6* when the message "Press F6 key if you need to install third party SCSI or RAID driver" appears.

2. When the Windows XP/2000 Setup window is generated, press **S** key to specify an Additional Device(s).

3. Insert the driver diskette into drive A: and press Enter.

4. Choose one of the following items:

   "*WinXP SiS Raid/IDE Controller* ",

   "*Win2000 SiS Raid/IDE Controller*",

that appears on screen, and then press the Enter key.

5. Press Enter to continue with installation or if you need to specify any additional devices to be installed, do so at this time. Once all devices are specified, Press Enter to continue with installation.

6. From the Windows XP/2000 Setup screen, press the Enter key. Setup will now load all device files and then continue the Windows XP/2000 installation.

7. **Please install the driver package again (ex. SiS RAID driver v1.03) while the operation system has been setup.**

Remark:

If you would like to install windows to any RAID sets, you should create RAID from BIOS RAID setting Utility or SiS964 RAID Utility first and then follow the steps above. Pleaser refer to step 3 or step 4.

Existing Windows XP/2000 Installation

1. Install the driver by execute SiS RAID driver setup utility.

2. The drivers will be automatically installed.

Confirming Windows XP/2000 Driver Installation

1. From Windows XP/2000, open the Control Panel from "My Computer" followed by the System icon.

2. Choose the "Hardware" tab, then click the "Device Manager" tab.

3. Click the "+" in front of "SCSI and RAID Controllers" hardware type. The driver *" SiS 180 Raid Controller "* should appear.

Step 3. BIOS Utility Operation

Note:

For the best performance and reliability, please read "Performance Hints and Recommend Setting" section in **Step 0**.

Starting BIOS Utility

1. Boot your system. If this is the first time you have booted with the SiS964 and the drives installed, the BIOS will display the following.

Silicon Integrated Systems Corp. RAID BIOS Setting Utility v0.XX
(c) 2003-2005 Silicon Integrated Systems Corp. All Rights Reserved.

Press <Ctrl><S> to run BIOS Setting Utility
Scan Devices. Please wait…………

    Primary Master   : XXXXXXXXXX   XXXXXMB UDMA X
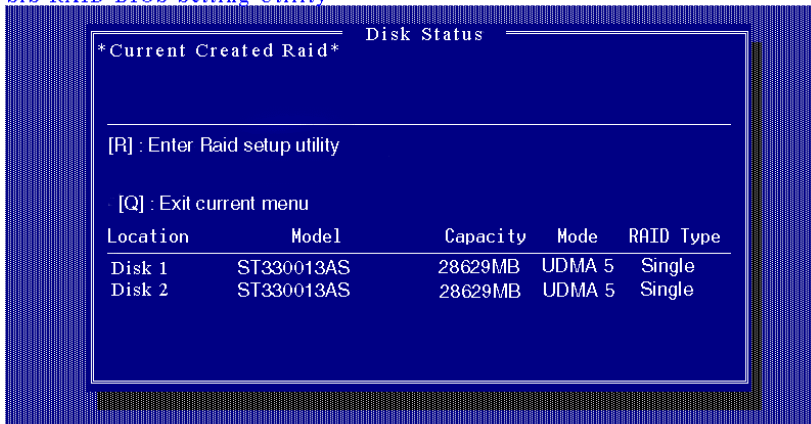
    Secondary Master : < SATA Device Not Found >

[RAID Information]

[RAID Information] includes some statements. See below :

a. **No RAID Install !!** → Not any completed RAID exists.

b. **Raid 1 (Mirror) : [Disk X] [Disk X]** → Have a RAID set.

c. **Broken RAID detected. Do you want to enter Setup Menu (Y/N)? Y**
   → You can select [Y] to enter setup menu to handle it. Or you can select [N] to ignore this message.

d. **Found a new HD! Do you want to rebuild RAID 1? Y** → Occurs when the controller has broken Raid 1 and single HDD existing simultaneously and the location of single HDD is just conformed it's rebuild conditions.

e. **The Raid is wrong!! Do you want to fix it??(Y/N)** → Occurs when the locations of two SATA HDD change owing to ATA HDD existing or not.

2. Press <Ctrl-S> keys to display the SiS964 Utility Main Menu.
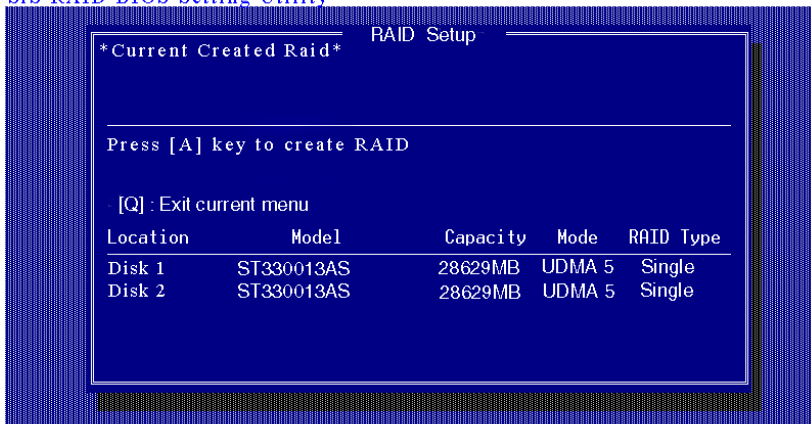

SiS RAID BIOS Setting Utility

```
                                    Disk Status
   *Current Created Raid*


   [R] : Enter Raid setup utility

   [Q] : Exit current menu
   Location         Model           Capacity   Mode    RAID Type
   Disk 1       ST330013AS         28629MB    UDMA 5    Single
   Disk 2       ST330013AS         28629MB    UDMA 5    Single
```

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3. Press <R> to display the RAID setup menu below. This is the fastest and easiest method to create your first array. The [A] and [D] key will appear randomly in the different conditions.

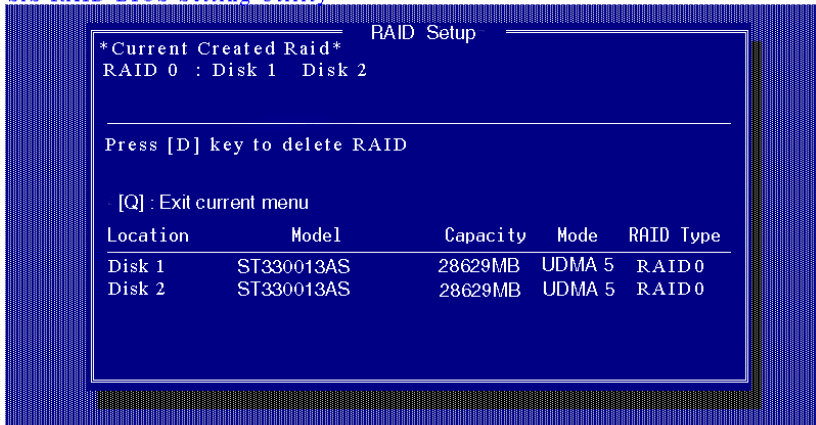[a]. **No RAID existing but have available disks existing** :

SiS RAID BIOS Setting Utility

```
                                    RAID Setup
   *Current Created Raid*


   Press [A] key to create RAID

   [Q] : Exit current menu
   Location         Model           Capacity   Mode    RAID Type
   Disk 1       ST330013AS         28629MB    UDMA 5    Single
   Disk 2       ST330013AS         28629MB    UDMA 5    Single
```

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[b]. **No available disk existing but have RAID existing**:

SiS RAID BIOS Setting Utility
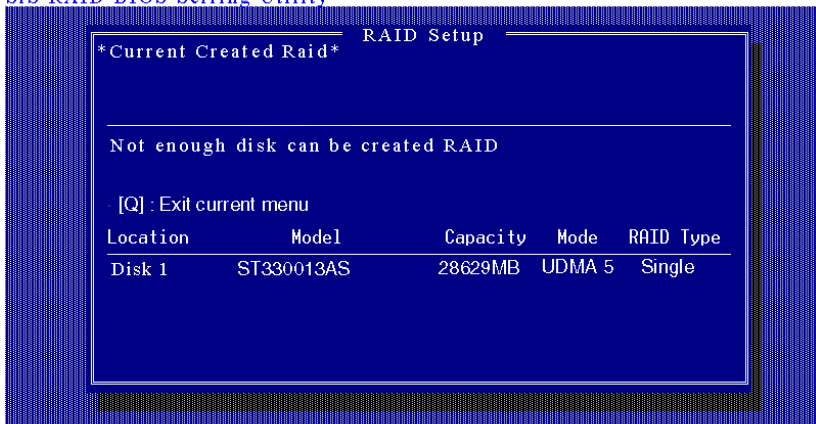
```
                              RAID  Setup
*Current Created Raid*
RAID 0  : Disk 1   Disk 2


Press [D] key to delete RAID

  [Q] : Exit current menu
Location          Model          Capacity    Mode    RAID Type

Disk 1        ST330013AS         28629MB    UDMA 5   RAID 0
Disk 2        ST330013AS         28629MB    UDMA 5   RAID 0
```

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[c]. **Available disk is not enough to create RAID**:

SiS RAID BIOS Serring Utility

```
                              RAID  Setup
*Current Created Raid*



  Not enough disk can be created RAID

  [Q] : Exit current menu
Location          Model          Capacity    Mode    RAID Type

Disk 1        ST330013AS         28629MB    UDMA 5   Single
```

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Create RAID

Creating a RAID 0 (Stripe) Array for Performance

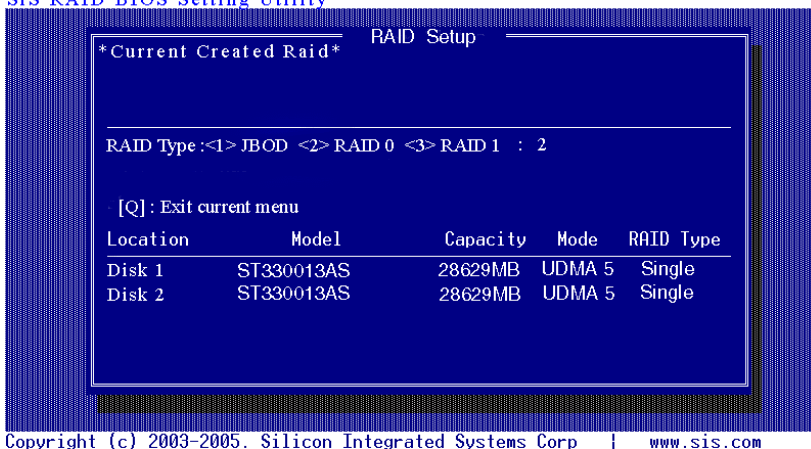*NOTE:*

SiS964 only supports 2 SATA drivers to create a stripe array.

To create an array for best performance, follow these steps:

1. Press <A> to start creating a RAID array.

2. Press <2> and <Enter> to select RAID 0.

3. You will have two selections to create a RAID 0 array. **The default value is <1>**. If you select **<1>Auto Create**, you can create a RAID 0 array faster and easier. The Blocksize will be selected by its default value **"64K"**. The result after auto creating will be shown on **step 6**. Besides, you also can select **<2>Manual Create**, see following steps.
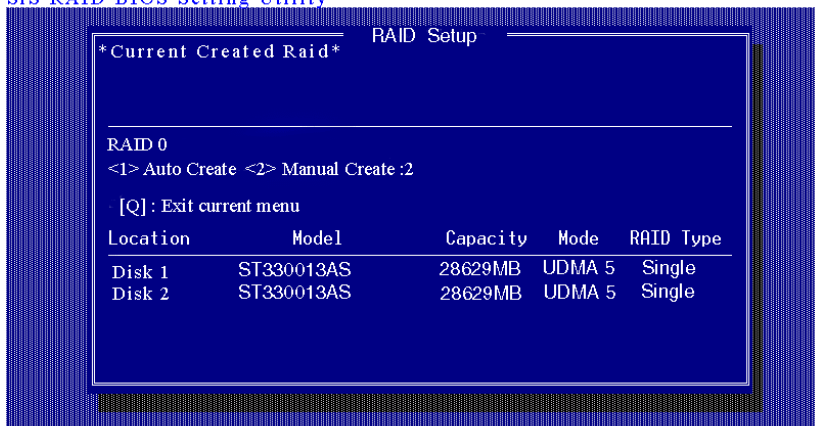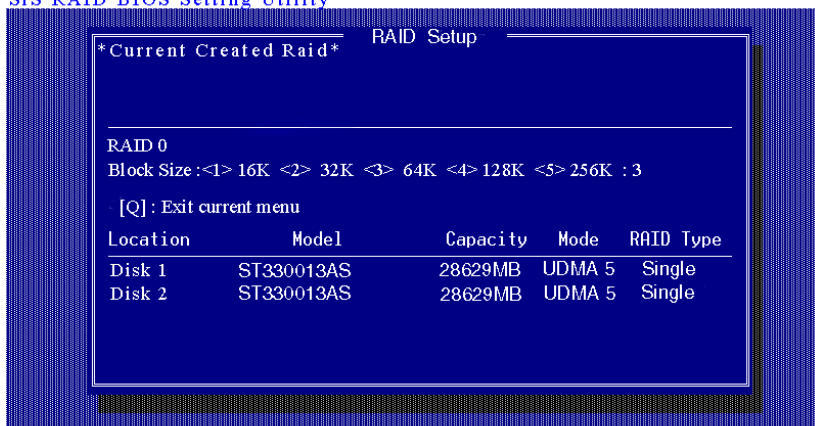
4. Press <1>—<5> keys and <Enter> to select Block Size. (Default : 64K)

5. Use $<\uparrow><\downarrow>$ to select disk , and press <Enter> to select disk, <Q> to exit. When you press <Enter> on the disk you wanted, the RAID Type will be changed from **Single** to **RAID 0**. And the disk you select first will be the SOURCE disk.
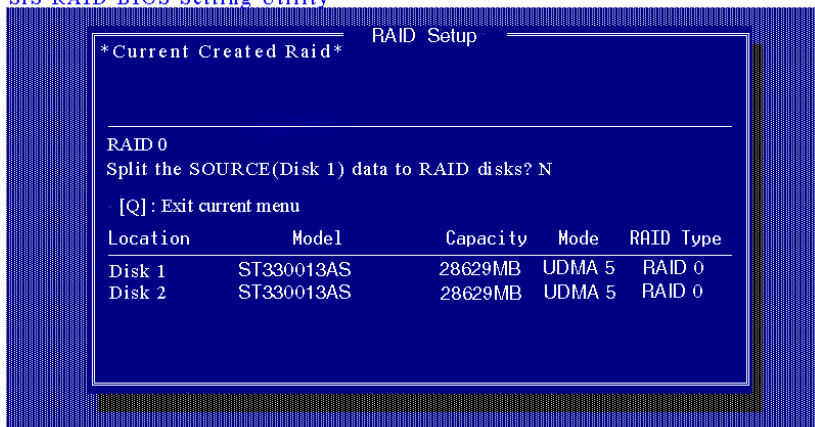
SiS RAID BIOS Setting Utility
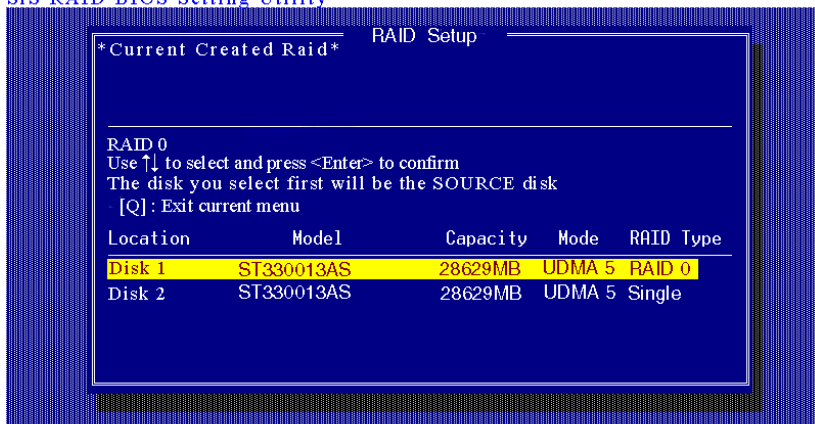
```
                          RAID Setup
*Current Created Raid*



RAID 0
Use ↑↓ to select and press <Enter> to confirm
The disk you select first will be the SOURCE disk
  [Q] : Exit current menu
Location        Model        Capacity    Mode   RAID Type
Disk 1        ST330013AS     28629MB    UDMA 5  RAID 0
Disk 2        ST330013AS     28629MB    UDMA 5  Single
```

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6. Next, you will see a message "**Split the SOURCE(Disk x) data to RAID disks?**". Press <N> and <Enter> to create RAID 0 array only or press <Y> and <Enter> to split the data from source disk to other disks.
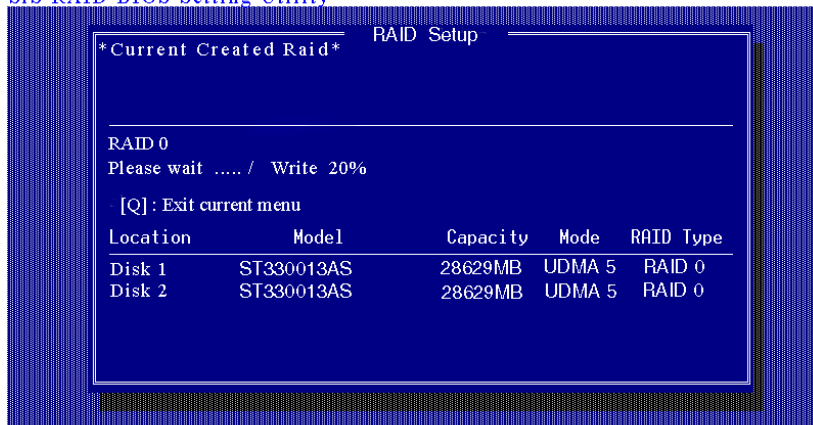
SiS RAID BIOS Setting Utility

```
                          RAID Setup
*Current Created Raid*



RAID 0
Split the SOURCE(Disk 1) data to RAID disks? N

  [Q] : Exit current menu
Location        Model        Capacity    Mode   RAID Type
Disk 1        ST330013AS     28629MB    UDMA 5  RAID 0
Disk 2        ST330013AS     28629MB    UDMA 5  RAID 0
```

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7. Starting splitting action, the following frame will be shown.

```
SiS RAID BIOS Setting Utility
┌─────────────────────────── RAID Setup ───────────────────────────┐
│ *Current Created Raid*                                            │
│                                                                   │
│                                                                   │
│ ─────────────────────────────────────────────────────────────── │
│ RAID 0                                                            │
│ Please wait ..... /  Write  20%                                   │
│                                                                   │
│  [Q] : Exit current menu                                          │
│ Location       Model          Capacity   Mode    RAID Type       │
│                                                                   │
│ Disk 1       ST330013AS       28629MB   UDMA 5   RAID 0          │
│ Disk 2       ST330013AS       28629MB   UDMA 5   RAID 0          │
│                                                                   │
│                                                                   │
└───────────────────────────────────────────────────────────────────┘
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```
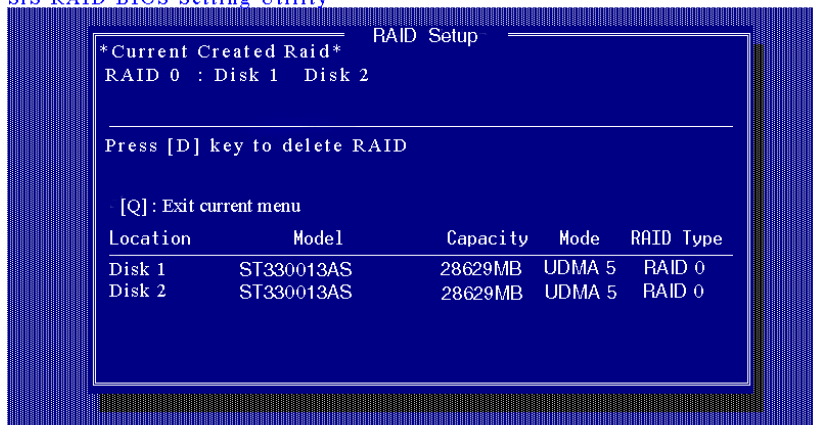
8. After all steps finished, press <Q> until escape the setup menu and RAID 0 array will be shown on the top of the main frame.

```
SiS RAID BIOS Setting Utility
┌─────────────────────────── RAID Setup ───────────────────────────┐
│ *Current Created Raid*                                            │
│ RAID 0  : Disk 1   Disk 2                                         │
│                                                                   │
│                                                                   │
│ Press [D] key to delete RAID                                      │
│                                                                   │
│  [Q] : Exit current menu                                          │
│ Location       Model          Capacity   Mode    RAID Type       │
│                                                                   │
│ Disk 1       ST330013AS       28629MB   UDMA 5   RAID 0          │
│ Disk 2       ST330013AS       28629MB   UDMA 5   RAID 0          │
│                                                                   │
│                                                                   │
└───────────────────────────────────────────────────────────────────┘
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```

9. Press <Q> until exit this BIOS utility and the red message frame will show. Press <Y> and <Enter> to save changes.
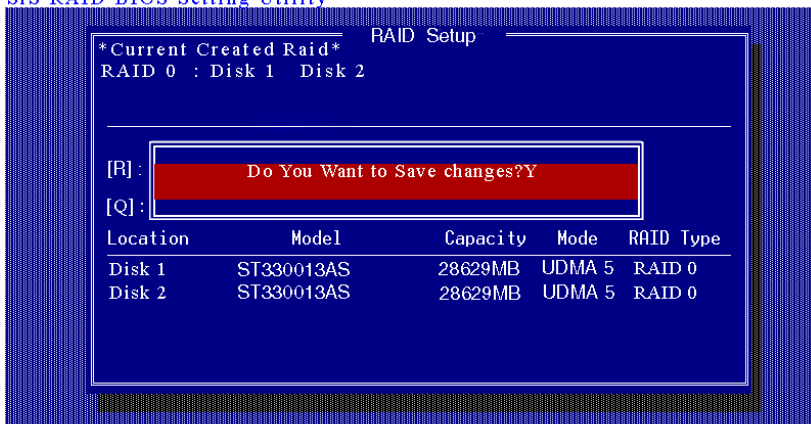
10. Once the array has been created, you will need to FDISK and FORMAT the array as if it was a new single hard drive.
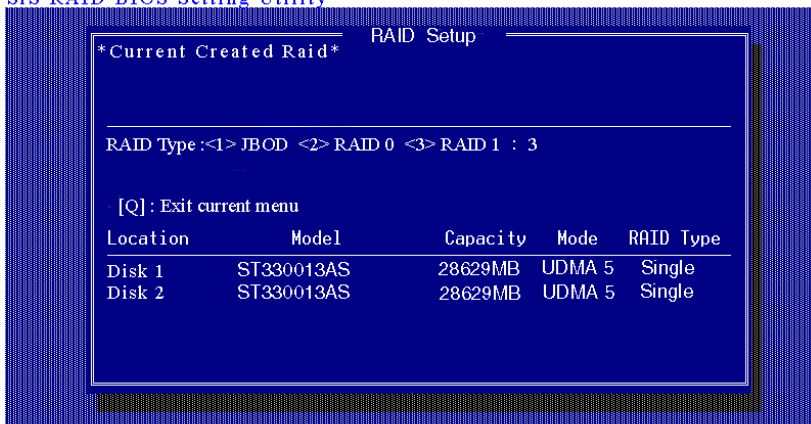
Creating a RAID 1 (Mirror) Array

NOTE:

- *SiS964 enables users to create Mirror arrays with pair of drives only.*

To create a Mirror array, follow these steps:

1. Press <A> to start creating a RAID array.
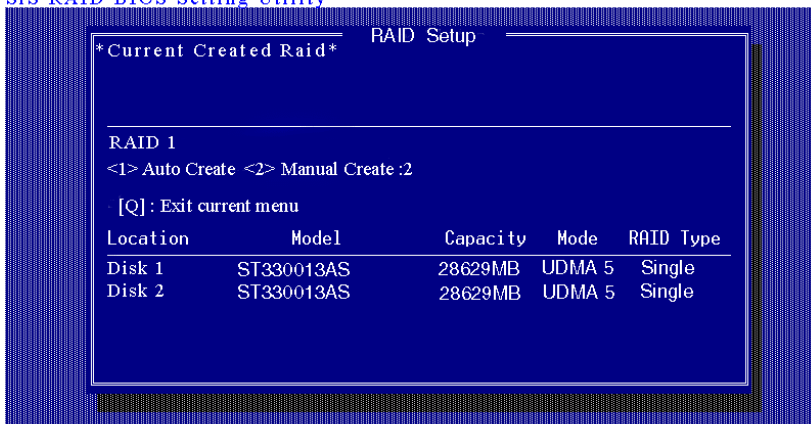
2. Press <3> and <Enter> to select Mirror.

3. You will have two selections to create a RAID 1 array. **The default value is <1>**. If you select **<1>Auto Create**, you can create a RAID 1 array faster and easier. The result after creating will be shown on **step 5**. Besides, you also can select **<2>Manual Create**, see following steps.

4. Use $<\uparrow><\downarrow>$ to select disk , and press <Enter> to select disk, <Q> to exit. When you press <Enter> on the disk you wanted, the RAID Type will be changed from **Single** to **RAID 1**. The same as RAID 0, the disk you select first will be the SOURCE disk.
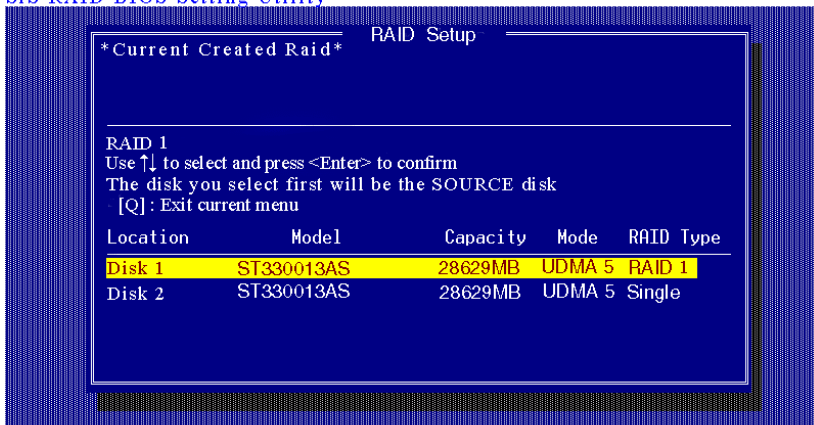
5. Next, you will see a message "**Duplicate the SOURCE(Disk x) data to RAID disks?**". Press <N> and <Enter> to create RAID 1 array only or press <Y> and <Enter> to duplicate the data from source disk to mirror disk.
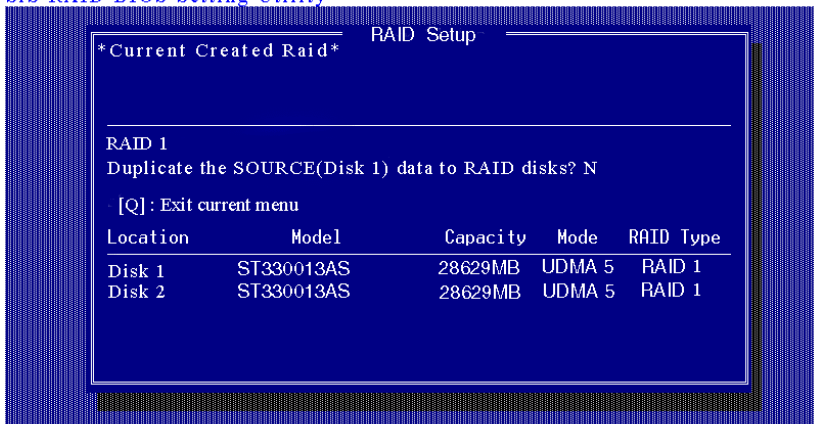
6. Starting duplicating action, the following frame will be showing.

```
SiS RAID BIOS Setting Utility
┌──────────────────────── RAID Setup ────────────────────────┐
│ *Current Created Raid*                                       │
│                                                              │
│                                                              │
│  RAID 1                                                      │
│  Please wait ..... \ Write 10%                              │
│   [Q] : Exit current menu                                   │
│  Location      Model         Capacity   Mode   RAID Type    │
│                                                              │
│  Disk 1        ST330013AS     28629MB   UDMA 5  RAID 1      │
│  Disk 2        ST330013AS     28629MB   UDMA 5  RAID 1      │
│                                                              │
└──────────────────────────────────────────────────────────────┘
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```
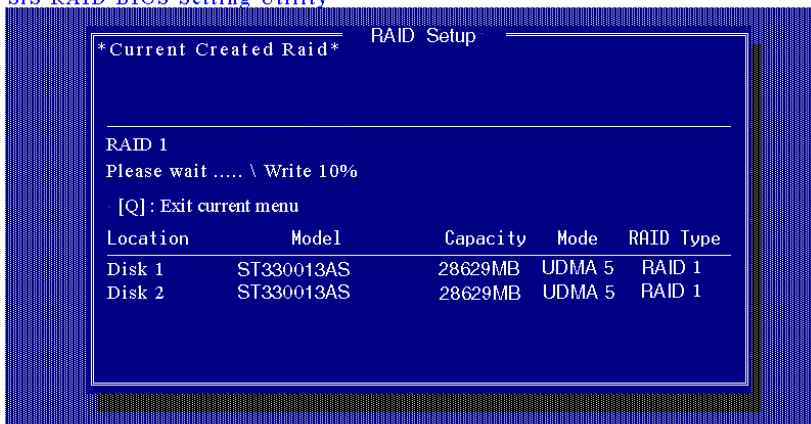
7. After all steps finished, press <Q> until escape the setup menu and RAID 1 array will be shown on the top of the main frame.
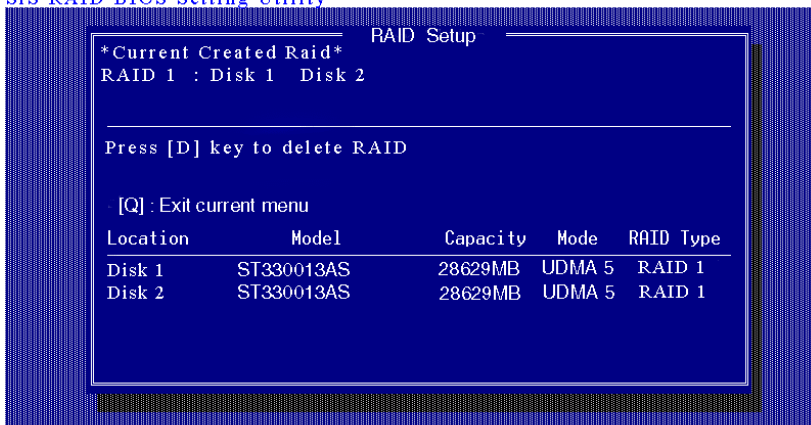
```
SiS RAID BIOS Setting Utility
┌──────────────────────── RAID Setup ────────────────────────┐
│ *Current Created Raid*                                       │
│  RAID 1  : Disk 1   Disk 2                                   │
│                                                              │
│  Press [D] key to delete RAID                               │
│   [Q] : Exit current menu                                   │
│  Location      Model         Capacity   Mode   RAID Type    │
│                                                              │
│  Disk 1        ST330013AS     28629MB   UDMA 5  RAID 1      │
│  Disk 2        ST330013AS     28629MB   UDMA 5  RAID 1      │
│                                                              │
└──────────────────────────────────────────────────────────────┘
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```

8. Press <Q> until exit this BIOS utility and the red message frame will show as the same as the creation of the RAID 0 array. Press <Y> and <Enter> to save changes.
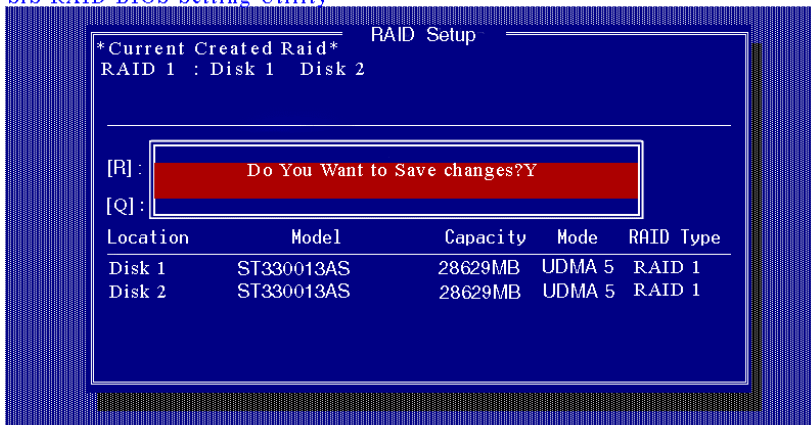
9. Once the array has been created, you will need to FDISK and FORMAT the array as if it were a new single hard drive.
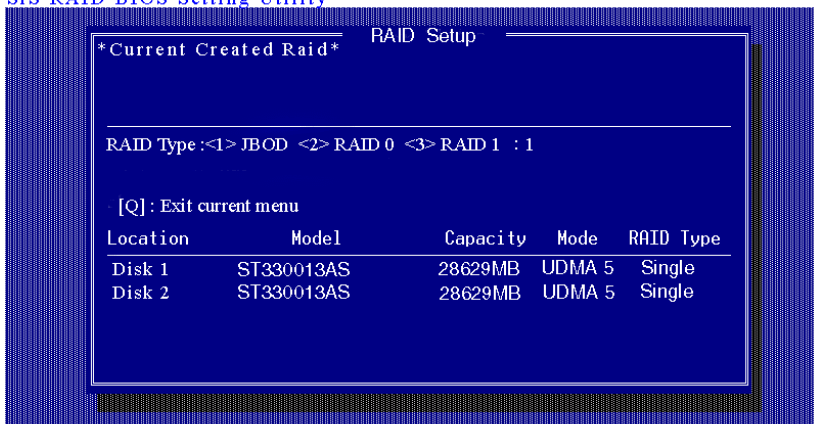
Creating a JBOD Array

NOTE:

   SiS964 only supports 2 SATA drivers to create a JBOD array.

To create a JBOD array, follow these steps:

1. Press <A> to start creating a RAID array.

2. Press <1> and <Enter> to select JBOD.

```
SiS RAID BIOS Setting Utility
┌──────────────────────────────────────────────────────────────┐
│          ┌──────────────── RAID  Setup ──────────────┐        │
│          │ *Current Created Raid*                     │        │
│          │                                            │        │
│          │                                            │        │
│          │ RAID Type :<1> JBOD  <2> RAID 0  <3> RAID 1  : 1   │
│          │                                            │        │
│          │  [Q] : Exit current menu                   │        │
│          │ Location      Model         Capacity   Mode    RAID Type │
│          │ Disk 1      ST330013AS      28629MB   UDMA 5   Single │
│          │ Disk 2      ST330013AS      28629MB   UDMA 5   Single │
│          │                                            │        │
│          │                                            │        │
│          └────────────────────────────────────────────┘        │
│                                                                │
└──────────────────────────────────────────────────────────────┘
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```

3. You will have two selections to create a JBOD array. **The default value is <1>**. If you select **<1>Auto Create**, you can create a JBOD array faster and easier. The result after creating will be shown on **step 5**. Besides, you also can select **<2>Manual Create**, see following steps.

```
SiS RAID BIOS Setting Utility
┌──────────────────────────────────────────────────────────────┐
│          ┌──────────────── RAID  Setup ──────────────┐        │
│          │ *Current Created Raid*                     │        │
│          │                                            │        │
│          │                                            │        │
│          │ JBOD                                       │        │
│          │ <1> Auto Create  <2> Manual Create  : 2    │        │
│          │                                            │        │
│          │  [Q] : Exit current menu                   │        │
│          │ Location      Model         Capacity   Mode    RAID Type │
│          │ Disk 1      ST330013AS      28629MB   UDMA 5   Single │
│          │ Disk 2      ST330013AS      28629MB   UDMA 5   Single │
│          │                                            │        │
│          └────────────────────────────────────────────┘        │
└──────────────────────────────────────────────────────────────┘
Copyright (c) 2003-2005. Silicon Integrated Systems Corp  |   www.sis.com
```
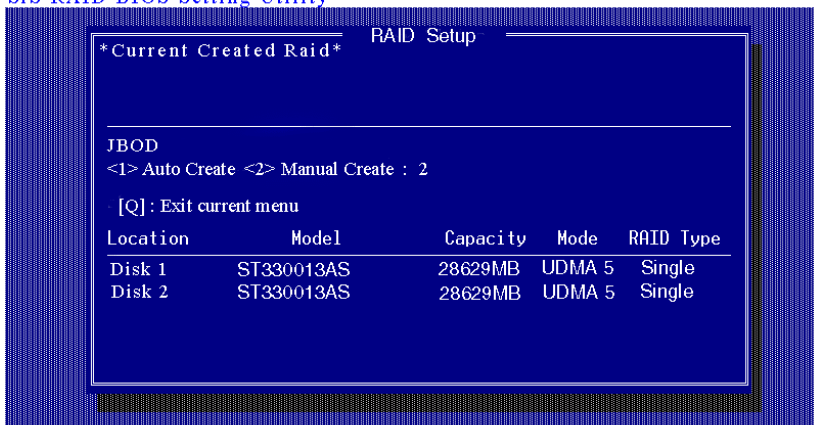
4. Use $<\uparrow><\downarrow>$ to select disk , and press <Enter> to select disk, <Q> to exit. When you press <Enter> on the disk you wanted, the RAID Type will be changed from **Single** to **JBOD**.
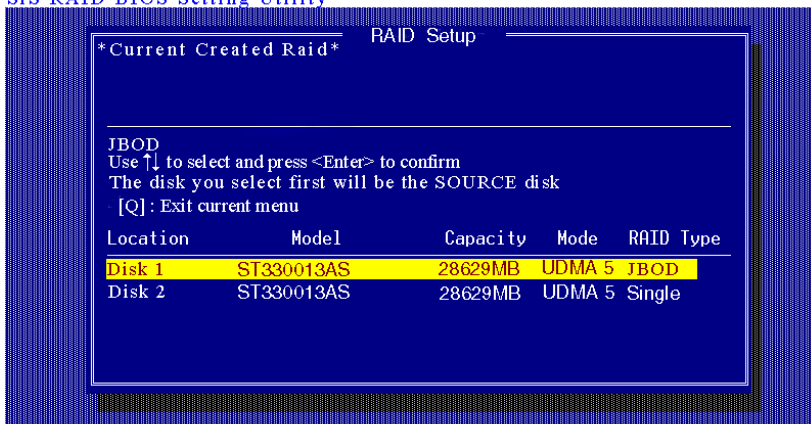
5. After all steps finished, press <Q> until escape the setup menu and JBOD array will be shown on the top of the main frame.
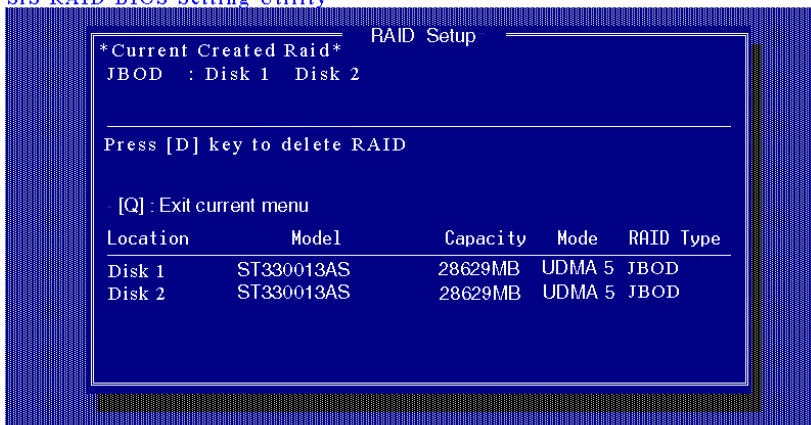
6. Press <Q> until exit this BIOS utility and the red message frame will show as the same as the creation of the RAID 0 array. Press <Y> and <Enter> to save changes.
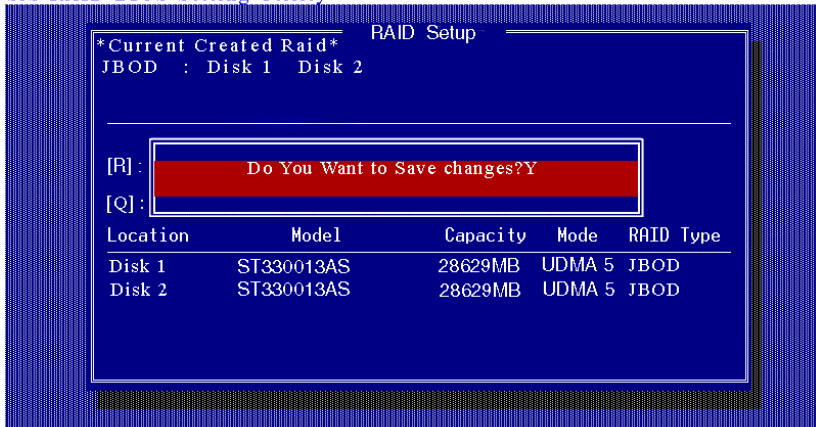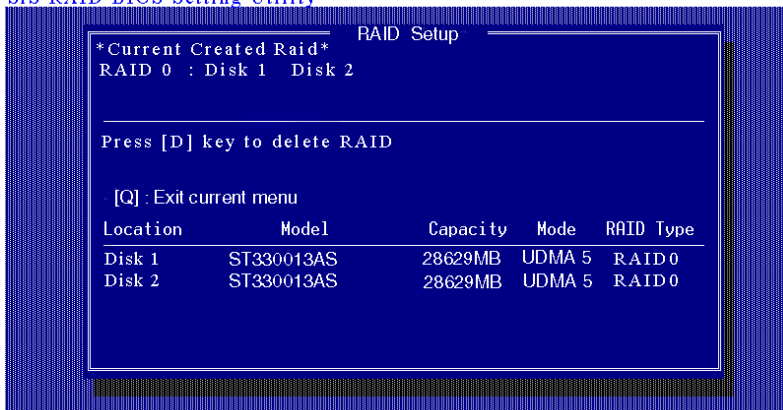
7. Once the array has been created, you will need to FDISK and FORMAT the array as if it were a new single hard drive.

Delete RAID

Starting to delete a RAID array

1. After enter the SiS964 Utility Main Menu, press <R> to display the RAID setup menu below. This is the fastest and easiest method to delete your first array.

2. Press <D> to start deleting a RAID array.
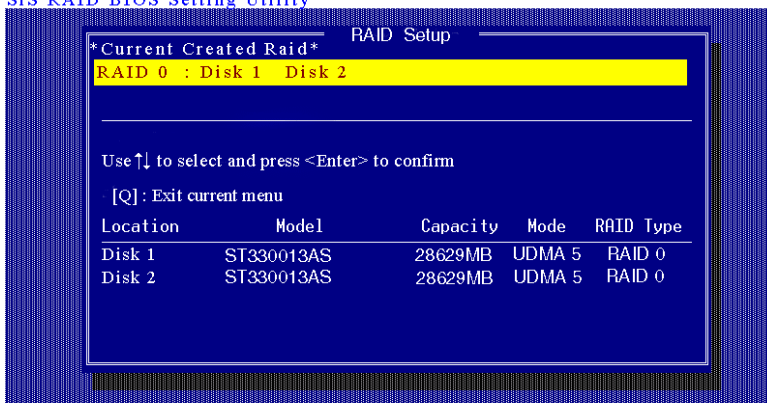
3. Press <Enter> to select the RAID array that you want to delete. And a message "**Are you sure to delete this RAID?**" will show on this frame.

SiS RAID BIOS Setting Utility

```
                              RAID  Setup
*Current Created Raid*
RAID 0  : Disk 1   Disk 2



Are you sure to delete  this RAID ? Y

 [Q] : Exit current menu

Location          Model          Capacity   Mode    RAID Type

Disk 1         ST330013AS         28629MB   UDMA 5   RAID 0
Disk 2         ST330013AS         28629MB   UDMA 5   RAID 0
```
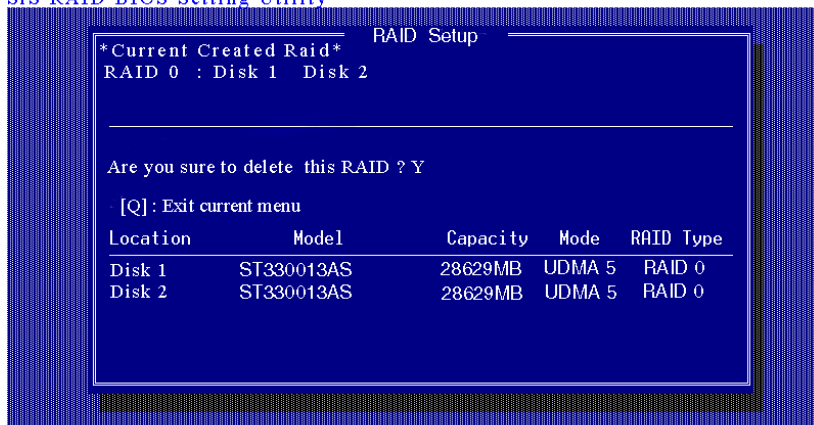
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4. Press <Y> and <Enter>, the deleting action finish. And the RAID Type of all disk members of this RAID array will be changed from **RAID 0** to **Single**.

SiS RAID BIOS Setting Utility

```
                              RAID  Setup
*Current Created Raid*



Press [A] key to create RAID

 [Q] : Exit current menu

Location          Model          Capacity   Mode    RAID Type

Disk 1         ST330013AS         28629MB   UDMA 5   Single
Disk 2         ST330013AS         28629MB   UDMA 5   Single
```
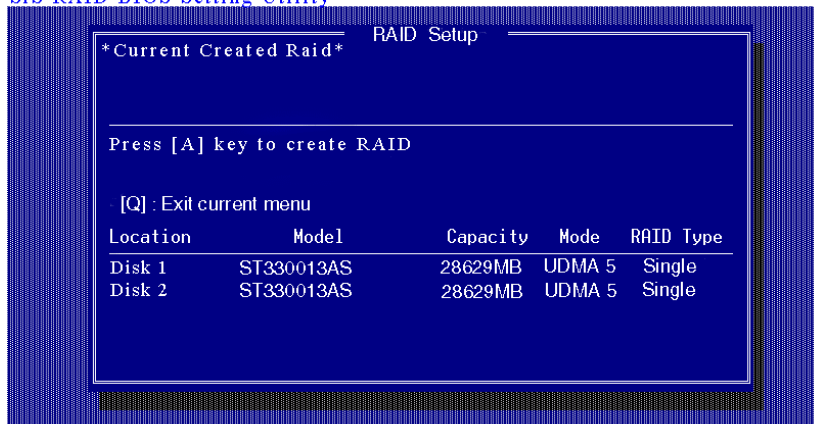
Copyright (c) 2003-2005. Silicon Integrated Systems Corp | www.sis.com

5. Press <Q> until escape the BIOS Utility, and the red message frame will show on it.
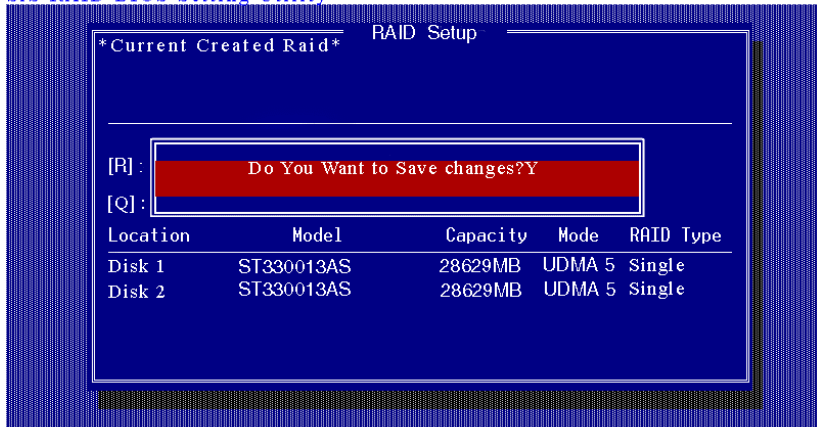
```
SiS RAID BIOS Setting Utility
┌──────────────────────────────────────────────────────────────┐
│          *Current Created Raid*      RAID Setup                │
│                                                                │
│                                                                │
│        [R]:┌────────────────────────────────────────┐         │
│            │     Do You Want to Save changes?Y       │         │
│        [Q]:└────────────────────────────────────────┘         │
│        Location        Model         Capacity  Mode  RAID Type │
│                                                                │
│        Disk 1      ST330013AS        28629MB  UDMA 5  Single   │
│        Disk 2      ST330013AS        28629MB  UDMA 5  Single   │
│                                                                │
│                                                                │
│                                                                │
└──────────────────────────────────────────────────────────────┘
Copyright (c) 2003-2005. Silicon Integrated Systems Corp  |  www.sis.com
```

6. Press <Y> and <Enter> to save all changes.

Step 4. SiS964 RAID Utility

Note:
1. For the best performance and reliability, please read "Performance Hints and Recommend Setting" section in **Step 0**.
2. This Utility only supports **Windows XP/2000**.

Starting to use SiS964 RAID Utility

1) After installing the SiS RAID utility, go to "Start" menu and choose "Programs." From the "Programs" menu, choose "SiS RAID" and click on "SiSRaid".

The detail process of installing the SiS RAID utility, please refer 755 series user manual page 60

2) This SiS RAID utility will be resident in the toolbar. You can click the right button of the mouse on the SiS Raid Utility's icon and some selection will be popup. You can click "Exit" to close this resident utility or let it always be resident in the toolbar. Or click "SiS Raid" to open the SiS RAID Utility as Step (3). The "Help" will show the help document to tell you how to use this RAID Utility and the "About" will show as Step (5).

3) The SiS RAID Utility window opens as below. The main interface has two tabs: View and Configuration. You can switch to different tabs by clicking on it. On "View" tab, we can see some device information on different controllers. You can click the drop-down box "Adapter" to select the controller you want to use. The default value is the information of the first device on **"SiS RAID controller 1"**.
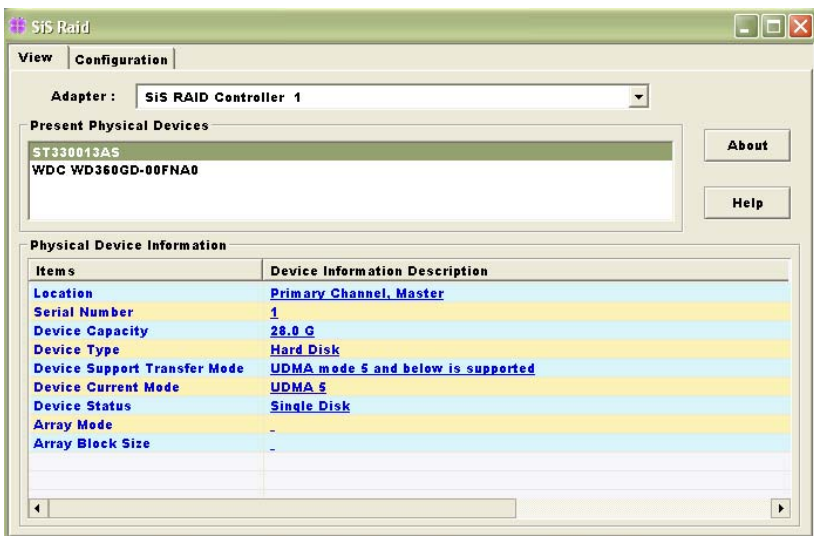
Besides, if this controller has some broken RAID existing, this AP will show some warning message on initial time. If this broken RAID is RAID 1, it will tell you that you can go to the "Raid Recovery" tab to recovery this broken RAID 1.

3) Click the button "Help", you can open a help document that tell you how to use this RAID utility.

4) Click the button "About", you can find an about message. It show that RAID utility version (version 0.XX) and some copyright information.
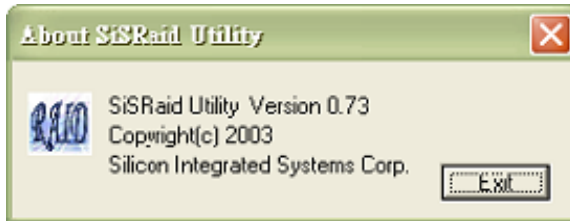
5) Click the tab "configuration", you can find three tabs: Create Raid, Delete Raid and Raid Recovery. In the same way, you can switch to different tabs by clicking on it.
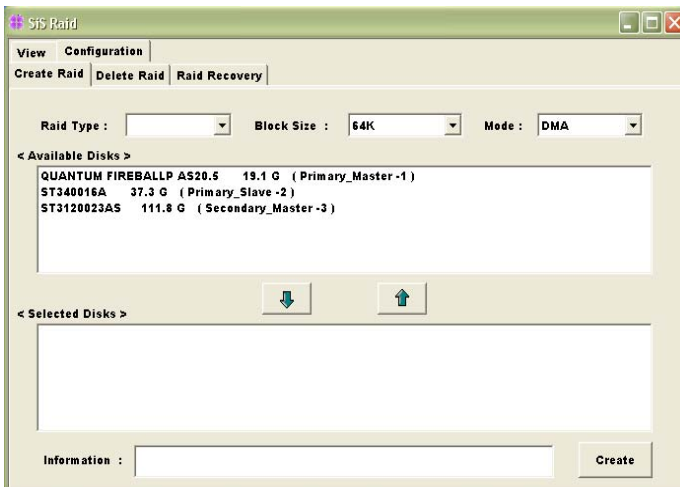
About Create Raid

Click the tab "Create Raid", you can find three drop-down boxs and three panes. Those meaning will be showing below.

Viewing the "Create Raid"

a) **Raid Type:** Click the drop-down box "Raid Type". This box enables the user to select array type. There are four array types that the user can select: JBOD, RAID 0 (Stripe) and RAID 1 (Mirror). User can select any one array type to create a RAID set.
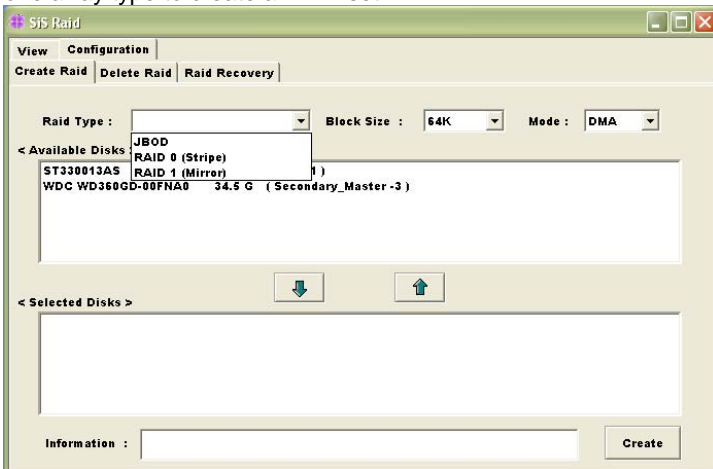
b) **Block Size:** If user selected RAID 0 array type in the "Array Type" box, the "Block Size" drop-down box will be enabled and user must select a block size. Clicking the drop-down box "Block Size", there are seven block sizes that the user can select: 8k, 16k, 32k, 64K, 128K, 256K and 512K. User can select any one block size to create a RAID 0 set. *The default selection is 64K.*
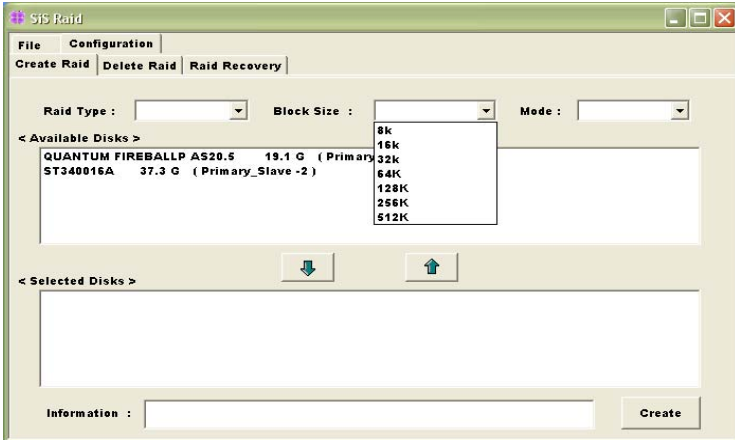
c) **Mode Type:** Click the drop-down box "Mode Type". This box enables the user to select mode type. There are two mode types that the user can select: PIO and DMA. User can select any one mode type to create a RAID set. *The default selection is DMA*.
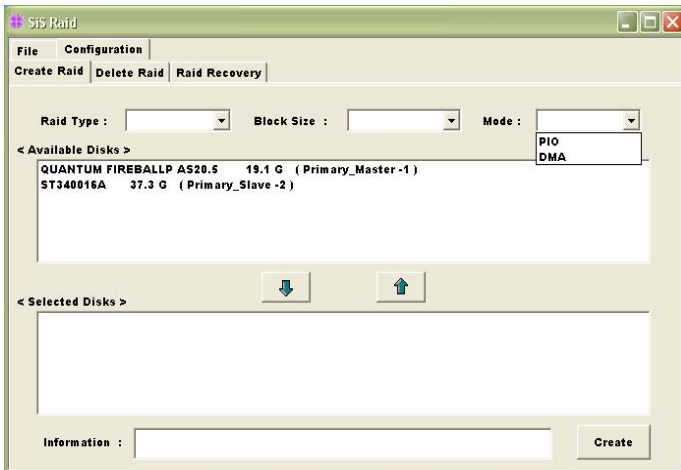
d) **Available Disks:** This pane will list out all the disks that can be used to create a RAID set currently. It will show some disk information.

e) **Selected Disks:** This pane will list out all the disks that have been selected to create a RAID set. User can highlight the specific disk that we want in the "Available Disks" pane and click the downward arrow icon or double click the marked disk to select the disk into the "Selected Disks" pane. In the same way, user can click the upward arrow icon or double click the marked disk in the "Selected Disks" to get back the disk that we might select wrong to the "Available Disks" pane.

f) **Information:** This pane will show the information about creating a RAID set after clicking the button "Create". The information may be "Please select the <Raid Type> first!", "Please select the <Mode Type> first!", "Please select the <Block Size> first!", "Please select the disk you want first!", "Mirror supports TWO DISKS only.", "Raid Created successful! Reboot please!!" or "Raid Creation failed!".

Information :	Please select the <Raid Type> first!	Create

Create a RAID set

a) To create a JBOD array, follow these steps:

NOTE: You should use two SATA hard disks to create a JBOD array.

---

1. "Configuration" → "Create Raid" → "Raid Type" → JBOD.
2. From the drop-down box "Mode Type", select the mode type you want or use the default value **"DMA"**.

Raid Type :	JBOD ▼	Block Size :	▼	Mode :	DMA ▼

3. From the "Available Disks" pane, select the disk and click downward arrow icon or double click it to add the disk on the "Selected Disks" pane.

4. When the JBOD array's configuration is finished, click the button

"Create". Then a warning message will be popup. Pay attention to the warning message, and then click "Yes" button to finish the creation of JBOD array, or click "No" button to cancel.
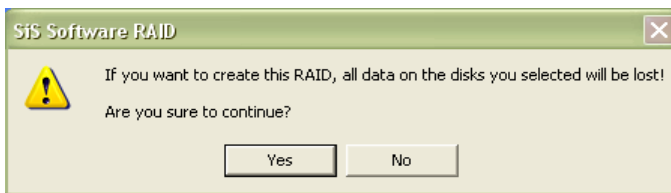
NOTE: *If the disk you selected has the ability of booting, another warning message will be popup before "SiS Software RAID" message. You can click "Yes" button to continue or click "No" button to cancel.*
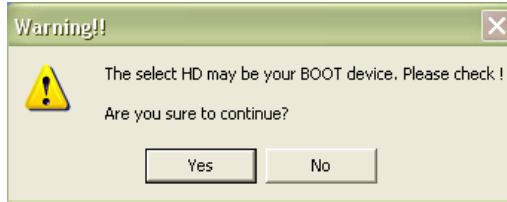
5. Next, another message box will be popup to tell user that disk setting has been changed and ask whether to restart the computer or not. Click "Yes" button to restart the computer and you can get new setting. Or click "Cancel" button to skip restarting.
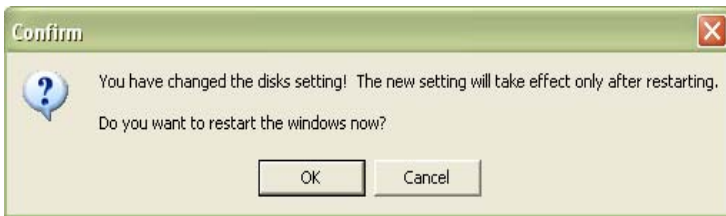
b) To create a RAID 0 (Stripe) array, follow these steps:

NOTE: You should use two SATA hard disks to create a RAID0 array.

1. "Configuration" → "Create Raid" → "Raid Type" → RAID 0.
2. From the drop-down box "Block Size", select the block size you want or use the default value **"64K"**.
3. From the drop-down box "Mode Type", select the mode type you want or use the default value **"DMA"**.

| Raid Type : | RAID 0 (Stripe) ▼ | Block Size : | 64K ▼ | Mode : | DMA ▼ |

4. From the "Available Disks" pane, select the disk and click downward arrow icon or double click it to add the disk on the "Selected Disks" pane. This action is the same as the operation to create a JBOD array.

5. When the RAID0 array's configuration is finished, click the button "Create". Then a "Create Stripe RaidSet" dialog will be popup.

<Note>

    Source : The first selected disk.

    Target : All other disks but first one.

    Create Only : This operation will destroy all data on all the selected disks and create a clean stripe array without any data on it.

    <Split data into Raid0 Set>

    Source is NOT a boot device: Split operation will split data from source disk into all the selected disks. In this operation, the source disk can't be a boot device.

    Source is a boot device: This operation is similar to "Source is NOT a boot device" operation, but the source disk is a boot device.

OK: Start the selected operation.

<Disk Copy Remaining Sector>: Show the remaining splitting data sector numbers.

NOTE: *miniCapacity x N > SourceCapacity*

miniCapacity: The minimum size of all selected disks.

SourceCapacity: The size of source disk.

N: Total disk numbers.

---

6. Next, you can click "OK" button to continue after the operation being selected. The differential warning messages will be popup following the differential operations. If the operation is **"Create Only"**, the warning messages are similar to JBOD array creation.

7. If the operation is **"Source is NOT a boot device"** of **<Split data into Raid0 Set>**, the following warning message will be popup, seeing below:
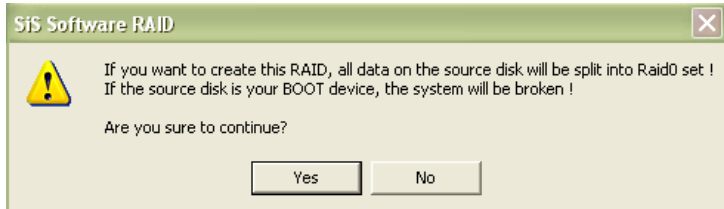
Next, you can click "Yes" button to start the operation or click "No" button to cancel. When you click "Yes" button to start this operation, the following warning message will be popup.

（）
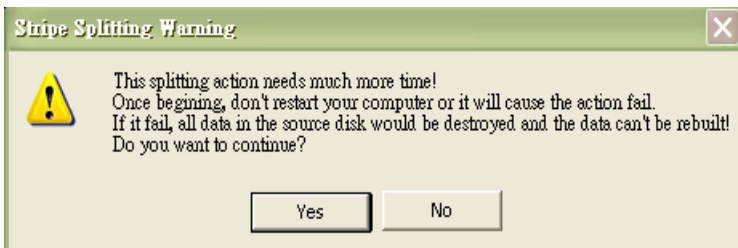
Next, you can click "Yes" button to start the operation or click "No" button to cancel. When you click "Yes" button to start this operation, the operation will begin.

When this operation is beginning, you still can click the destroy button on the "Create Stripe RaidSet" dialog to stop this operation. **But this action will cause the data of the source disk broken**. And the following message will be popup to remind you.
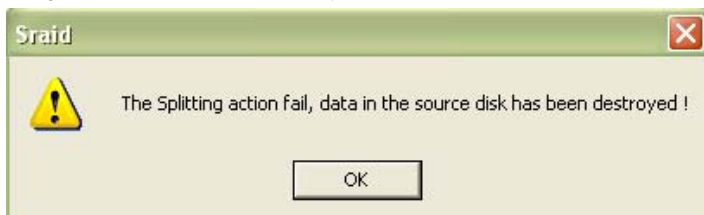
8. If the operation is **"Source is a boot device"** of **<Split data into Raid0 Set>**, the following warning message will be popup, seeing below:
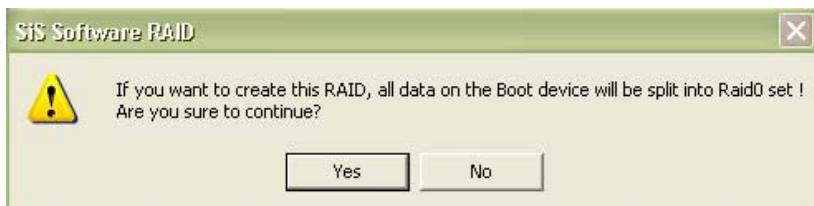
Next, you can click "Yes" button to start the operation or click "No" button to cancel. When you click "Yes" button to start this operation, the following warning message will be popup.
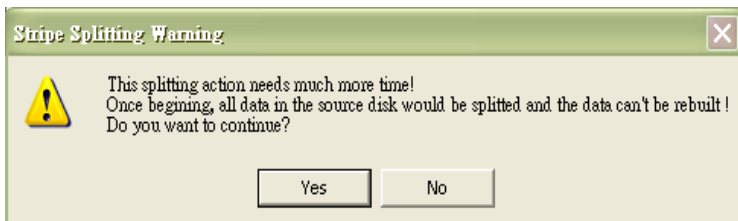
Next, you can click "Yes" button to start the operation or click "No" button to cancel. When you click "Yes" button to start this operation, the following warning message will be popup.
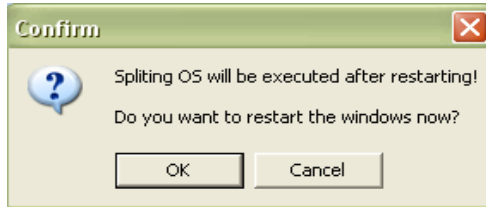
Next, you can click "Ok" button to restart the windows and start the operation **"Source is a boot device"** of **<Split data into Raid0 Set>**. Or click "Cancel" button to suspend this operation. But, this operation is still done after restarting the windows next time.

c) To create a RAID 1 (Mirror) array, follow these steps:

NOTE: You should use two SATA hard disks to create a RAID1 array.

1. "Configuration" → "Create Raid" → "Raid Type" → RAID 1.
2. From the drop-down box "Mode Type", select the mode type you want or use the default value **"DMA"**.

3. From the "Available Disks" pane, select the disk and click downward arrow icon or double click it to add the disk on the "Selected Disks" pane. This action is the same as the operation to create a JBOD array.

4. When the RAID1 array's configuration is finished, click the button "Create". Then a "Create Mirror RaidSet" dialog will be popup.

<Note>
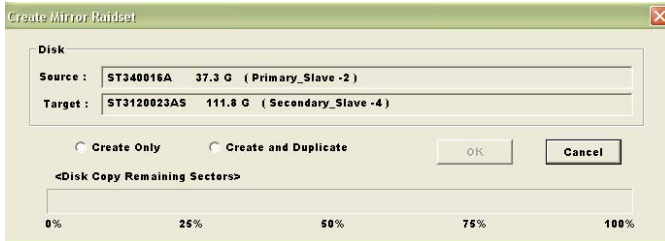
Source: The first selected disk.

Target: The second selected disk.

Create Only: This operation will destroy all data on all the selected disks and create a clean mirror array without any data on it.

Create and Duplicate: Duplicate operation will reserve data on the source disk and copy them onto the target disk.

OK: Start the operation.

Cancel: Cancel the operation.

<Disk Copy Remaining Sector>: Show the remaining copying data.

5. Next, you can click "Cancel" button to leave or click "OK" button to continue after the operation being selected. The warning messages will be popup following the differential operations. If the operation is **"Create Only"**, the warning messages are similar to JBOD array creation.

6. If the operation is **"Create and Duplicate"**, the following warning message will be popup, seeing below:
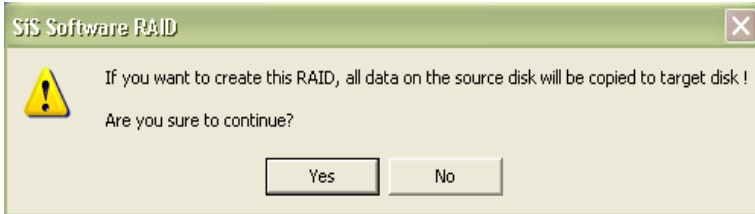
Next, you can click "Yes" button to start the operation or click "No" button to cancel. When you click "Yes" button to start this operation, the following warning message will be popup.
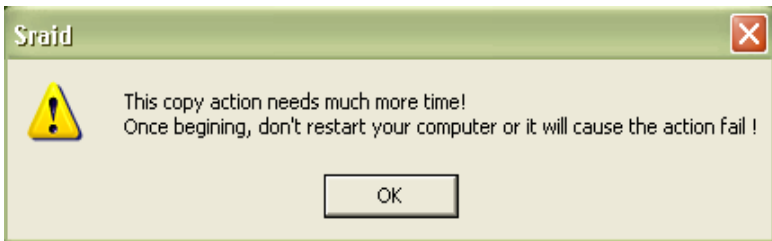
Click "OK" button to start this duplicating action. Don't restart your computer or it will cause the action fail.

7. When the operation is finished, the restart warning message will be popup as well as JBOD array creation.

About Delete Raid

Click the tab "Delete Raid", you can find some panes and two buttons. The RaidType meaning will show below.

Viewing the RaidType meaning

General case: **RAID0 (A = B C | D E)**

<Meaning>

RAID0: Raid Type

A: total number of disks in this Raid

B,C: the serial number of each disk in this Raid

D,E: a) Raid is correct, B=D C=E

       b) Raid is error, D or E will show "?" or "!".

In which, the meaning of "?" and "!" will show below.
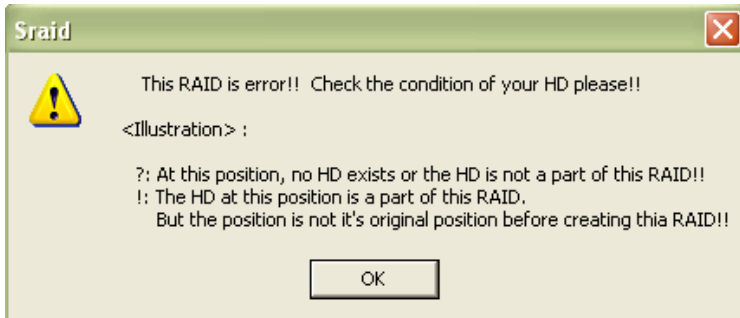
Delete a Raid set

a) To delete a JBOD, RAID0 or RAID1 array, follow these steps:

  1. "Configuration" → "Delete Raid", the following windows will appear:
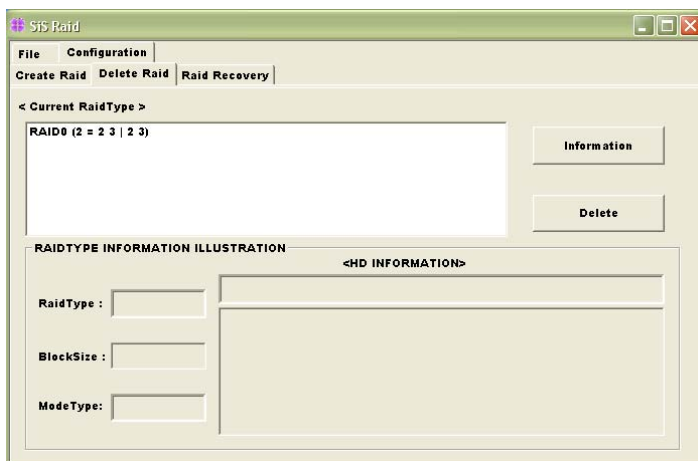
2. Highlight the disk array in the "Current RaidType" pane, and then click the "Information" button or double click the array. You can get some information about the disk array.

3. If you want to delete a disk array you selected, you can highlight the disk array and then click the button "Delete". Then a warning message will be popup, and pay attention to the warning message. You can click "Yes" to delete the selected disk array or click "No" to cancel.
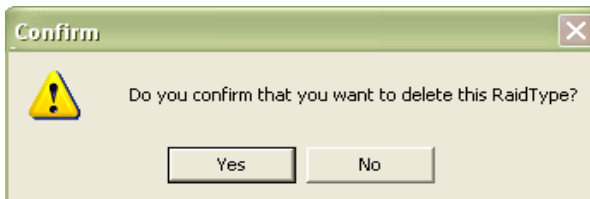
4. Next, another message will be popup to tell user the setting of these disks have been changed and ask whether to restart the computer.
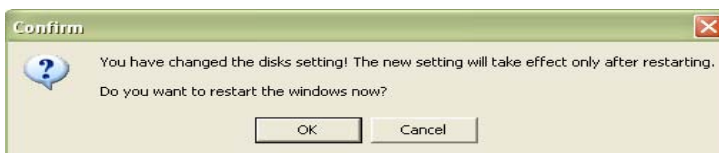
About Raid Recovery

Click the tab "Raid Recovery", you can find two panes and some buttons. Those meaning will be showed below.

Raid Recovery Operation

NOTE: The recovering operation is workable only when error RAID1 set exist.

---

a) First, you can click the button "Available Raid" to find whether any error Raid set existing. See below:

 Next, highlight the error Raid set you want to recovery. And you can click the button "OK" to continue or click "Cancel" to cancel this operation.

b) After "Available RAID" selected, click the button "Available Disk" to find whether any empty hard disk existing. See below:

 Next, highlight the empty hard disk you want to select. And you can click the button "OK" to continue or click "Cancel" to give up this selection.

c)   When the "Available Raid" and "Available Disk" is finished, you can click the button "Start" to start this operation. And the button "Start" will become "Pause". Then you can click the button "Pause" to pause the thread operation. And the button "Pause" will become "Start". Or you can click the button "Stop" to cancel this operation. This operation can be broken off if you want to close this RAID utility or shut down your computer, and it can continue when you open this RAID utility again or restart you computer next time.
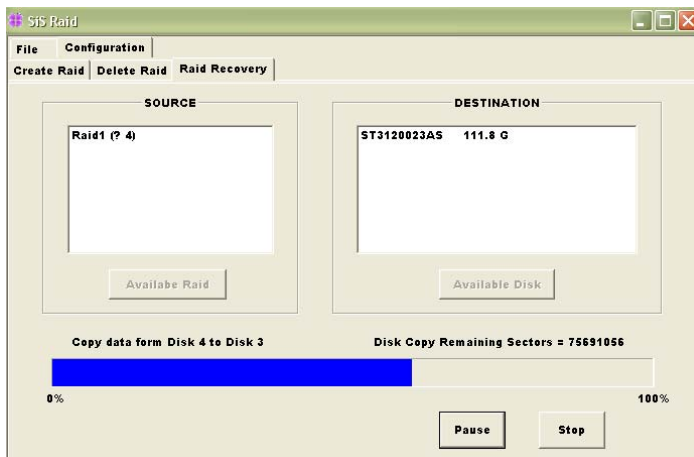
SATA RAID Software to be used with the SiI 3112

Product Overview

Silicon Image's SATARaid™ provides Serial ATA Software RAID including Striping and Mirroring to enhance the industry's first proven PCI-to-SATA host controller product. Two major challenges facing the storage industry today are keeping pace with the increasing performance demands of computer systems by improving disk I/O throughput and providing data accessibility in the face of hard disk failures. With the SiI 3112 Serial ATA host controller and SATARaid, both of these problems are solved.

RAID Striping greatly improves hard disk I/O performance by concurrently Striping data across multiple drives. RAID Mirroring enables users to enjoy the confidence of data availability regardless of a single disk failure as data is simultaneously written to two drives.

Standard with SATARaid software is a Graphical User Interface (GUI) that provides easy-to-use configurations for the different RAID Sets supported.

SATARaid Features

- RAID 0 and 1
- Hot Spare and On-line Mirror Rebuilding
- System GUI Monitoring Utility:
  - Displays/Logs/Alerts Users to Vital RAID Set Information
  - Manages RAID Set Functions (configures, rebuilds, etc.)
- RAID Set Accommodates Multiple Size HDDs
- HDDs Function Normally When Not in RAID Sets
- Adjustable Stripe Size for RAID 0
- Automatically Selects Highest Available Transfer Speed for All ATA and ATAPI Devices
- Supports:
  - UDMA up to 150MB/Sec.
  - All UDMA and PIO Modes
  - Up to 2 SATA devices
  - ACPI and ATA/ATAPI6

RAID Explained

RAID - Redundant Array of Independent Disks

RAID technology manages multiple disk drives to enhance I/O performance

and provide redundncy in order to withstand the failure of any individual member, without loss of data.

SATARaid provides two RAID Set types, Striped (RAID 0) and Mirrored (RAID 1).

Disk Striping (RAID 0)

Striping is a performance-oriented, non-redundant data mapping technique. While Striping is discussed as a RAID Set type, it is actually does not provide fault tolerance. With modern SATA and ATA bus mastering technology, multiple I/O operations can be done in parallel, enhancing performance. Striping arrays use multiple disks to form a larger virtual disk.

This figure shows a stripe set using three disks with stripe one written to disk one, stripe two to disk two, and so forth.

Disk Mirroring (RAID 1)

Disk mirroring creates an identical twin for a selected disk by having the data simultaneously written to two disks. This redundancy provides instantaneous protection from a single disk failure. If a read failure occurs on one drive, the system reads the data from the other drive.

Creating and Deleting RAID Sets (SATA3/4):

Creating and deleting RAID sets is a function found in the Raid Configuration Utility - Silicon Image. During booting up, the following message will appear, pausing for a few moments to allow the user to choose what to do:

<center>Press <Ctrl+S> or F4 to enter RAID utility</center>

An easy-to-use screen will appear with the following choices in the top left:

Create RAID Set
Delete RAID Set
Rebuild RAID Set
Resolve Conflicts
Low Level Format

Below this will be listed the drives currently installed on the system.

The top right half of the screen displays directions and comments for the user. The bottom right half lists the command keys:

Arrows up and down are Select Keys
ESC takes the user to the previous menu
Enter selects the user's choice
Ctrl-E exits the utility.

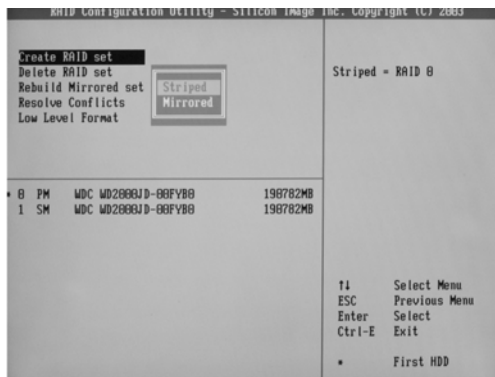**Creating RAID Sets (SATA3/4):**
During the Power-On Self Test (POST), press the <Ctrl> and <S> keys or
<F4> key simultaneously to enter the Raid Configuration Utility - Silicon
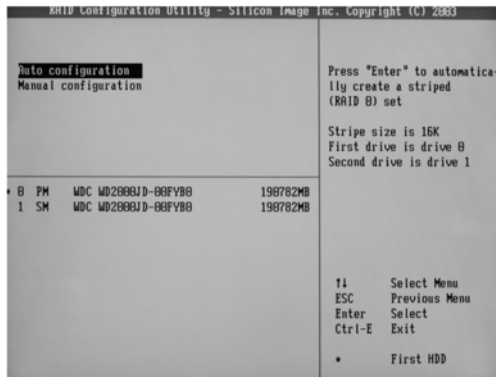Image. The following screen menu appears.
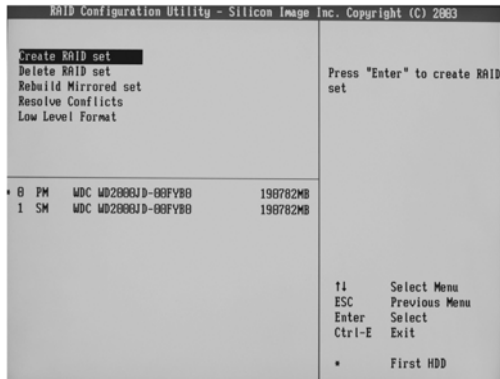
1. Switch the highlight bar to the ***Create RAID set*** and press the
   <Enter> key to create RAID set.
2. Switch the highlight bar to the ***Striped/Mirrored*** and press the
   <Enter> key to create RAID 0/1.

3. Select if you want the utility to Auto Configure the RAID Set or if you want
   to manually configure the RAID Set. For Striped Sets, you can change the

chunk size. For Mirrored Sets, you assign which is the Source and Target drives, as well as if you want Disk Copy.

What is Disk Copy? If the disk assigned as the source disk already has been partitioned and has data stored on it, and then a second disk is added for redundancy, the data on the source drive can be copied to the destination drive, so the disks are identical, and all subsequent data will be written to both drives as a Mirrored set. If, however, the source disk does not have data already stored on it, there is no need for Disk Copy.

4. The utility will ask "Are You Sure?" before completing the configuration.
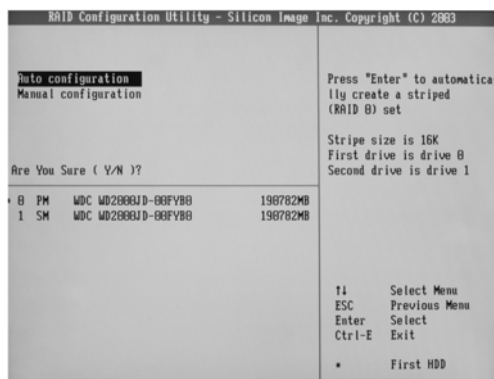
5. Press the <Y> key then the following screen appears.
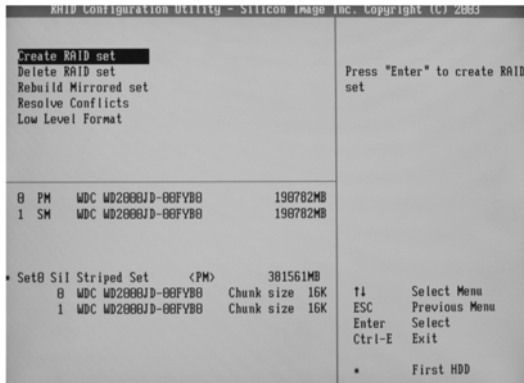
Deleting RAID set:

1. To remove one or more RAID sets select *Delete RAID set* and press the <Enter> key.
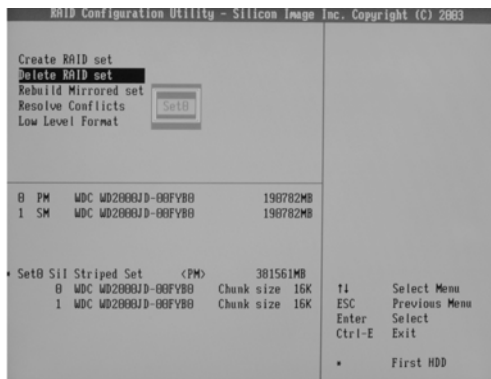
2. Select desired set and press Y when asked "Are You Sure?"
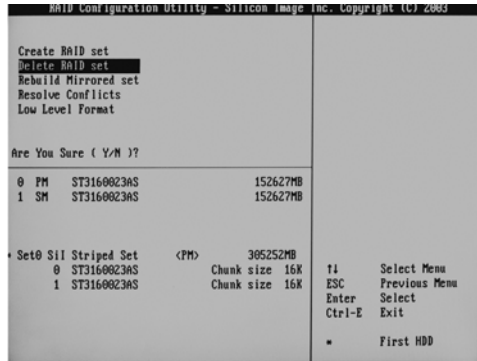
Resolving Conflict

When a RAID set is created, the metadata written to the disk includes drive connection information (Primary Channel, Secondary Channel). If, after a disk failure, the replacement disk was previously part of a RAID set (or used in another system), it may have conflicting metadata, specifically in reference to the drive connection information. If so, this will prohibit the RAID set from being either created or rebuilt,

In order for the RAID set to function properly, this old metadata must be first overwritten with the new metadata. To resolve this, select "Resolve Conflict" and the correct metadata, including the correct drive connection information, will be written to the replacement disk.

Low Level Format

Selecting this item will format your hard disk.

Installing Drivers and Software

Windows XP/2000 Operating System

The driver is located on the provided floppy disk. Insert the floppy disk into the floppy disk drive and click **Browse.**

Most floppy disk drives are configured as **[A:]**. Choose the **[A:]** drive in your browser and the **Si3112r.inf** file for the SiI 3112. Select the file and click **Open**:

Verify that the directly listed in this window is A: and click **OK**.

Now, a window verifying that the new Driver for the board has been properly installed. Click **Finish.**

It is always good to Restart the computer after an installation.When asked to do so, Click **Yes**.

To install SATARaid GUI, use Windows InstallShield by performing the following:

1. After computer restarts, insert cd in disk drive.
2. Double-click on **Install SATARaid.exe**.
3. Follow on-screen instructions to complete installation. Note: Do NOT install in the Start Up folder. Choose the Default folder (normally Accessories or Administrative Tools or something similar).

Attention:

After driver installation, please install JAVA-SATARaid.exe Windows user-interface utility. When complete, please install java runtime environment j2re-1_4_2-windows-i586-iftw.exe. Please note that when installing the java kernel, this requires an internet connection (ideally high-speed) to download the run-time environment.
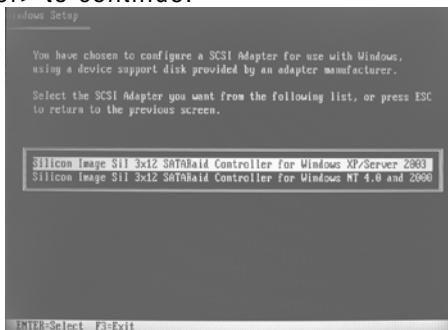
Install WinXP With Silicon 3112A RAID0:

1. Setup RAID0 function in the RAID Configuration Utility - Silicon Image.
2. Insert a WinXP installation CD.
3. Press the <F6> when the following picture appears:

Press F6 if you need to install a third party SCSI or RAID driver...
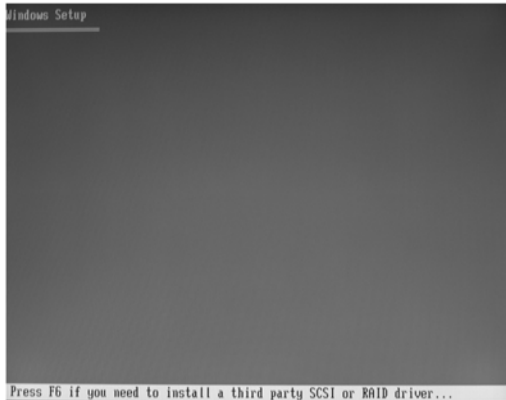
4. Insert the previous floppy disk (RAID driver installation disk).
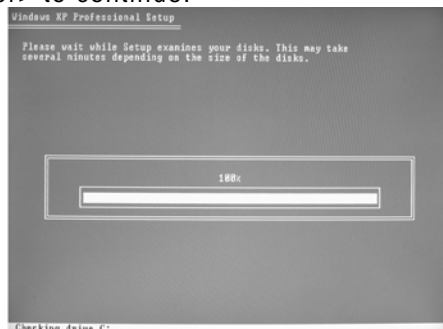5. Press <S> to continue.
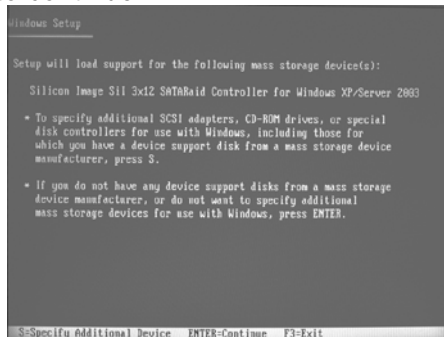
6. Press <Enter> to continue.

7. Press <Enter> to continue.

8. Press <Enter> to continue.

Install WinXP With Silicon 3112A RAID1:

1. Setup RAID1 function in Raid Configuration Utility - Silicon Image
2. The remainder of the process is the same as installing WinXP with RAID0

Install Win2K With Silicon 3112A RAID0:

The process is the same as installing WinXP with RAID0

Install Win2K With Silicon 3112A RAID1:

The process is the same as installing WinXP with RAID1

CREATING/NAMING PARTITIONS

The creating and naming of partitions is something done within the Windows operating system. And while Windows XP/2000 use the Disk Management window, there are enough nuances that make it important to follow the procedure specifically for the appropriate operating system. The procedure for Windows 98/Me is significantly different from the others.

Windows XP/2000
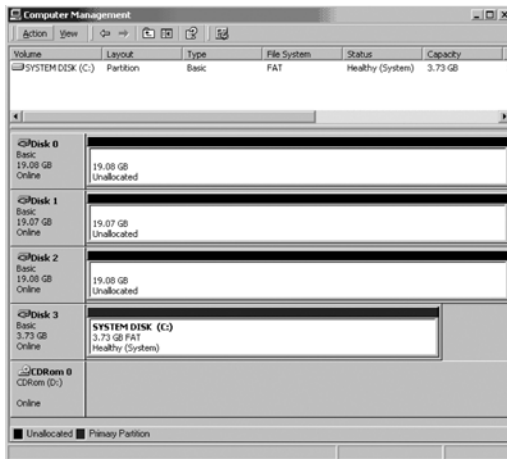
Windows XP/2000 Operating System

Before creating any partitions, RAID sets must firstly be created/dissolved by using the BIOS RAID Utility.

Once completed, continue booting Windows.

Once Windows is running, open the Disk Management window located at:

Control Panel→Administrative Tools→Computer Management→Storage→ Disk Management

Something similar to the following window should appear:
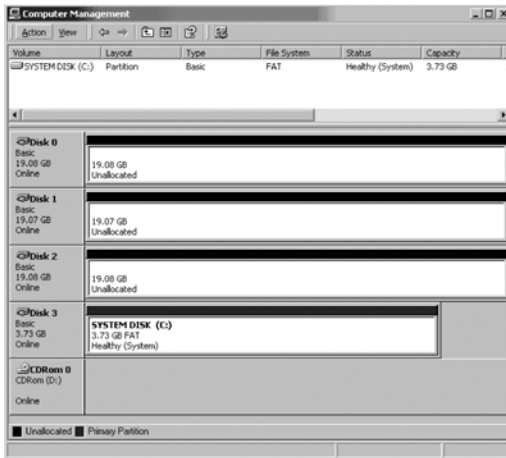
This window has three main sections:

SECTION 1: System listing of all formatted and available disks/RAID Sets.

SECTION 2: Report of physical connection of disks/RAID Sets.

SECTION 3: Report of partition status, disk letter, and volume name.

Initial Window

In **SECTION 2**, every disk should report as:

Basic

Disk Size (the actual available disk space will be reported here)

Online

Instead of "**Basic**", a disk may also report as either "Unknown" or "Dynamic".

If the disk reports as "Unknown", right-click on the disk (**SECTION 2**) and click on **Write Signature**.

At this point, a window will appear with the disk in question (all "Unknown" disks may appear in this window).Make sure the box next to each disk is checked, then click OK.

The disk should now report as "**Basic**".

If a disk reports as "**Dynamic**", right-click on **SECTION 2** of that disk, and click on "**Return disk to Basic...**" Within seconds the disk should report as **Basic**.

Creating Partitions

In **SECTION 2**, the disk order corresponds directly to the order the Sets appear in the BIOS. Therefore, the first Unallocated Partition represents Set 1, and so on.

1. At this point, there should be three disks with Unallocated partitions. Right- click on the partition of the first disk and click on "Create Partition". The "Create Partition Wizard" should appear.
   1. The first window is an introductory window to the Wizard. Click **Next**.
   2. The second window designates the partition as a primary partition. Click **Next**.
   3. The third window designates the partition size. Since this is a Striped RAID set, utilizing 2 disk drives, the size of the partition should be approximately double the size of a single disk drive (assuming all disks are of identical size). Click **Next**.
   4. The fourth window designates the drive letter of the partition.
   5. The fifth window allows the user to label the volume name, and choose the type of formatting to take place upon the creation of the partition. Choose which ever drive letter is desired (the lowest possible value is automatically entered), name the volume whatever is desired (suggestions being something generic such as STRIPED SET or something specific to use such as FINANCIAL, CRITICAL, MISCELLANEOUS, etc.) then check the box next to "quick format". Click **Next**.
   6. The sixth window is a summary window listing all of the selections made. lick **Finish**.

Depending on the size of the disk drive(s) included in the partition, the partition should change from "Unallocated" to "Healthy" with its name and drive letter reported as well in a matter of minutes or less. Do not attempt to create a partition for the next disk until the disk currently being formatted is complete and reports **Healthy**.

Also note that once the disk reports Healthy, it appears in the listing in **SECTION 1** with all of its pertinent information as well.

2. Repeat this procedure for the partition of the second and third disk.
3. Close the Data Management window by clicking on the small boxed "X" in the top right corner of the window.
4. Click on the "My Computer" icon on the Desktop. The three new drives should now be visible and properly named. Data may now be stored to each of these disks if desired.
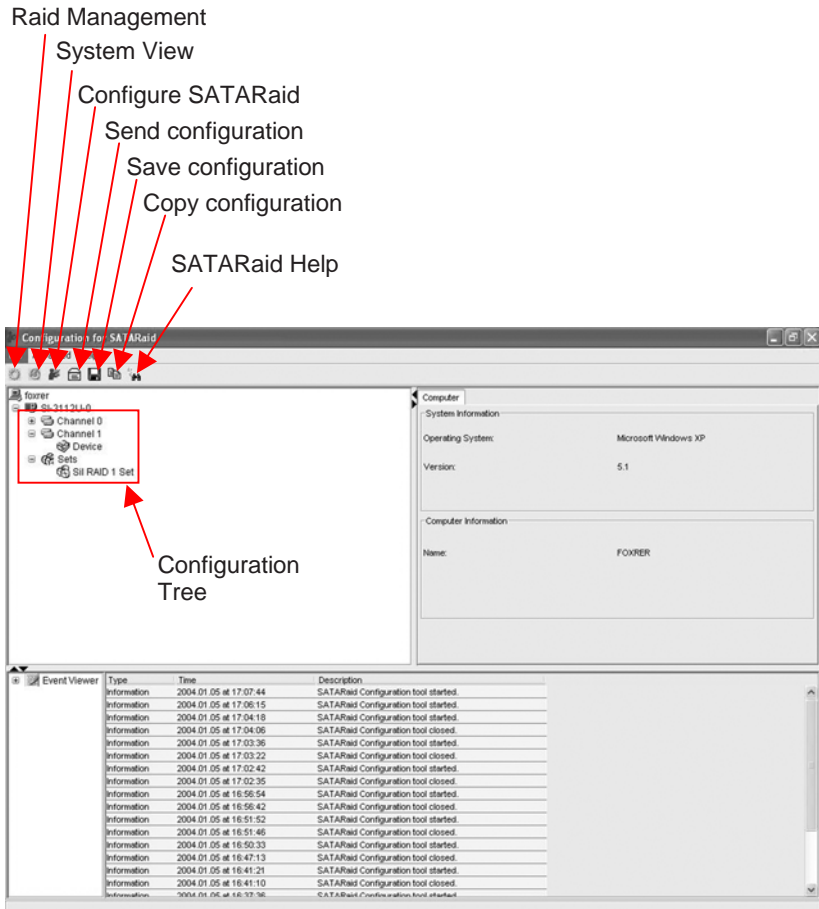
USING SILICON IMAGE SATARaid GUI

Overview

The SATARaid GUI offers the user the ability to easily monitor your RAID Set.

To launch the GUI, double-click on the icon located in the bottom right hand corner of the Desktop; or right-click on the icon located in the bottom right hand corner of the Desktop, and then clik "open".If the icon does not appear in the bottom right hand corner of the desktop, find where the application was saved and launch from there.

Upon launching the GUI, then the first window which identifies the computer running SATARaid should appear similar to the following:

Raid Management

System View

Configure SATARaid

Send configuration

Save configuration

Copy configuration

SATARaid Help

Configuration Tree

Selecting different component in the configuration tree provides specific information for that component, such as the chip.
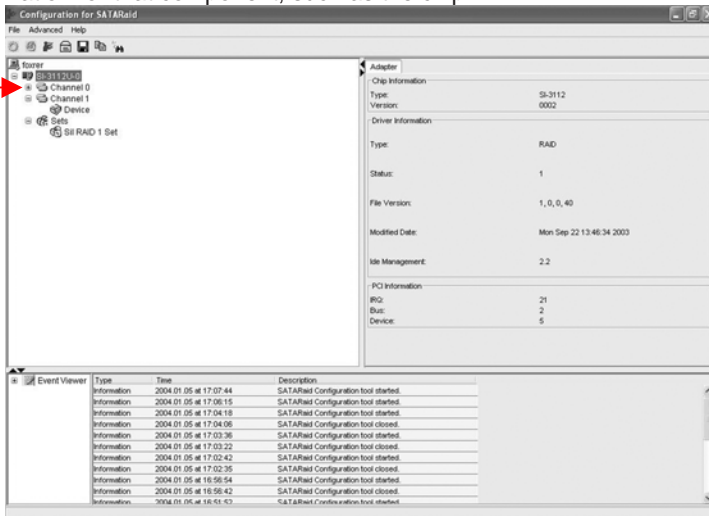
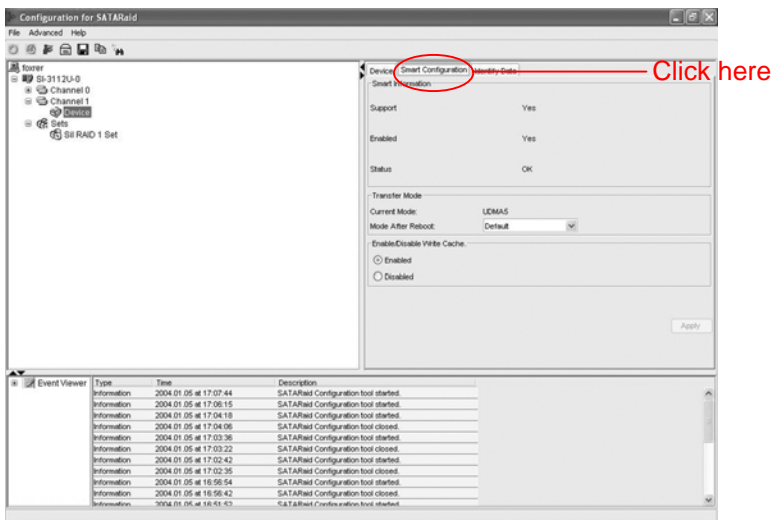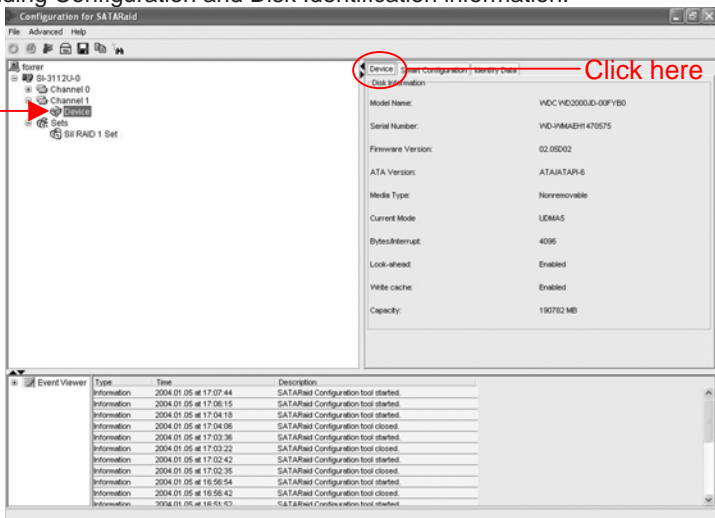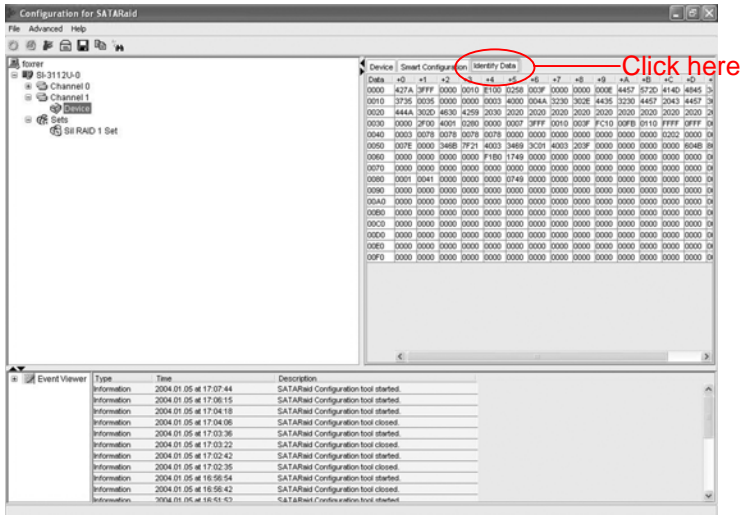Selecting a specific channel, either channel 0 or channel 1, the following information is reported:
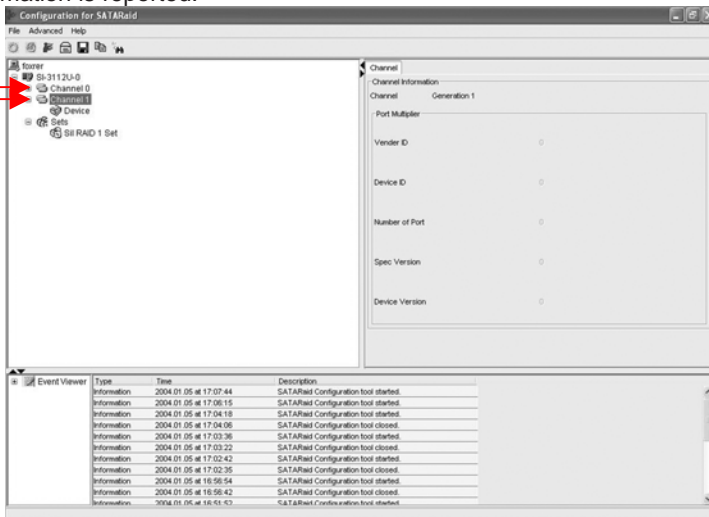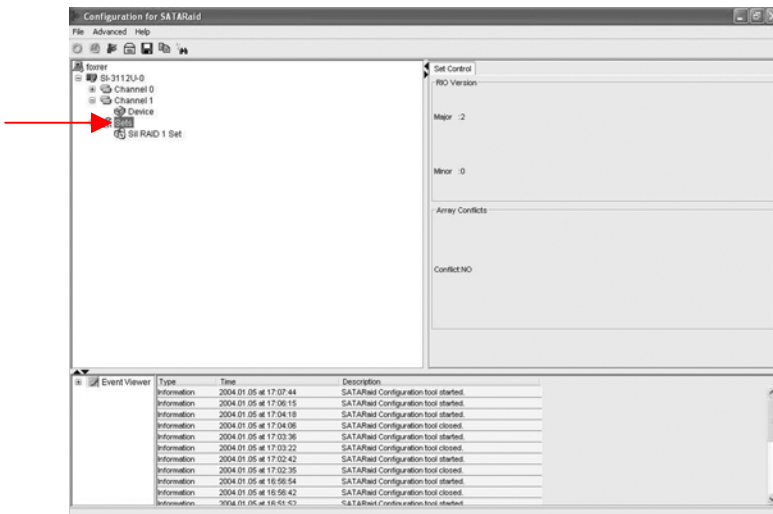
Selecting a specific drive reports all pertinent information to that drive, including Configuration and Disk Identification information.

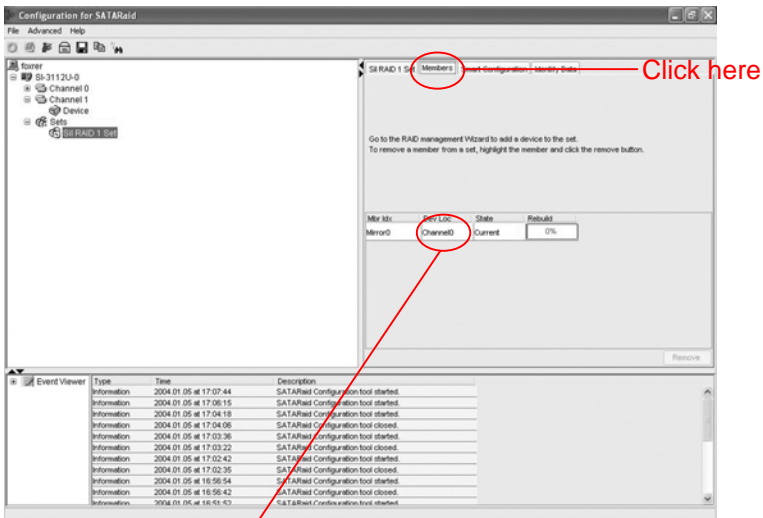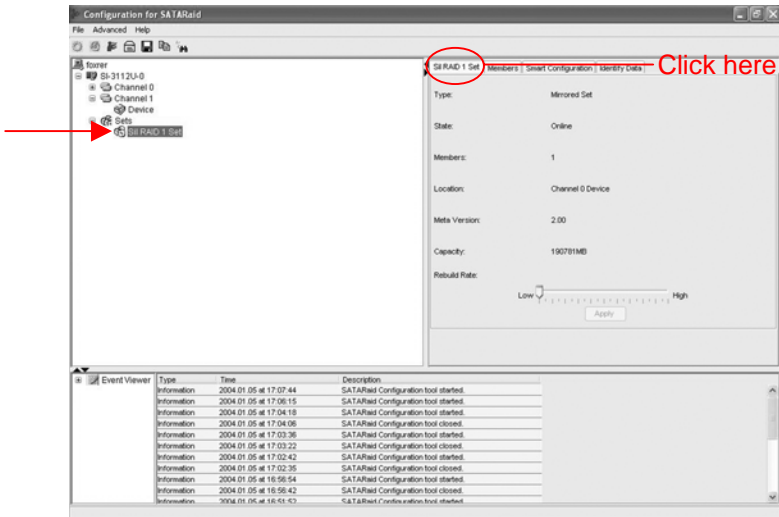Selecting Sets lists the Sets in the configuration tree and provides information on RIO Version:

By selecting a specific RAID set, such as Set 0, the type of RAID set, the number of members and capacity is reported.

The Device Location refers to how each physical disk was reported in the BIOS RAID utility.

The Members tab of this window reports the device identification (corresponding with the information in the BIOS) and the State of each device.

Besides reporting information, the Members tab of a Mirrored set allows the user to remove a specific drive from that set, as well as add a designated Spare drive to a Mirrored set that has experienced a disk failure. A drive can NOT be removed from a Striped set as this would destroy all data. Note that when a Mirrored Set is first created, the State of the "destination" drive may report as Rebuild for as much as 30-90 minutes depending on the size of the disk.

SMART and Configuration information, as well as Data Identification is again provided for each Set.

Click here
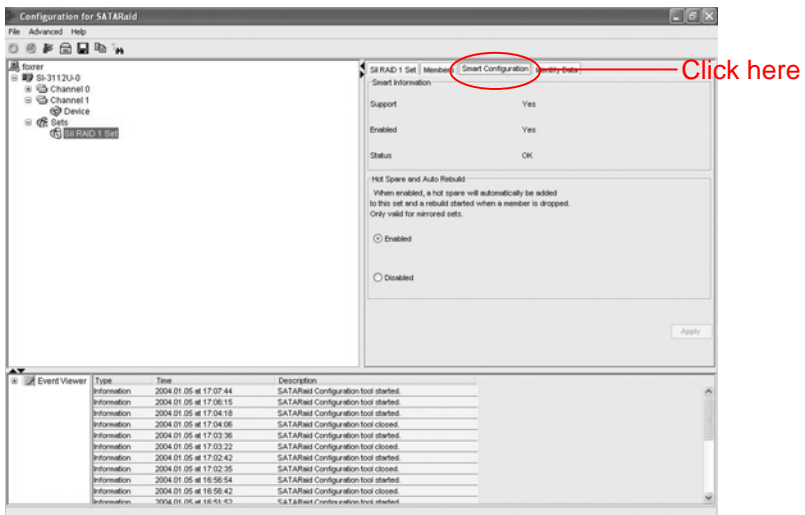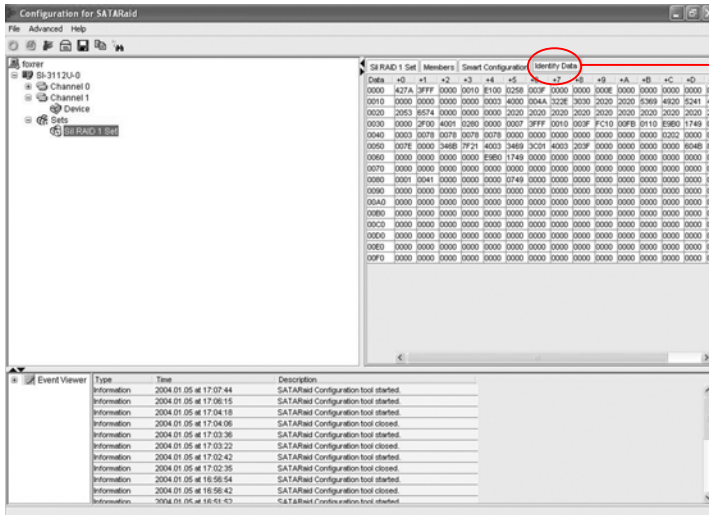
SATARaid Configuration Menu

By clicking on the toolbox icon in the top left of the SATARaid GUI window, or right-clicking on the conductor icon in the bottom right of the computer screen (with other start-up icons), the user may configure SATARaid including customizing the settings for SMTP, E-mail, Notification, Event Level, Log File, Audio, and Popup.
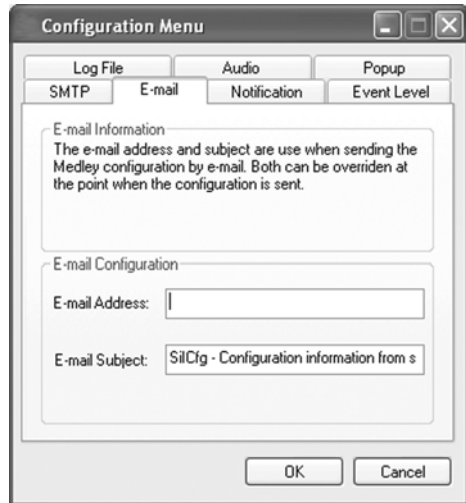
SMTP

The SMTP server is the server that is used to send e-mails.Normally, the network administrator knows what this name is. Both the name and domain must be entered.
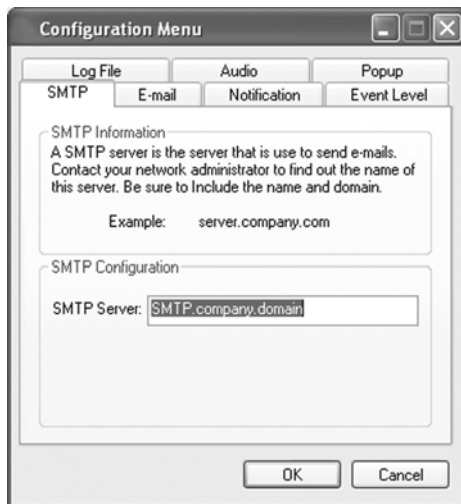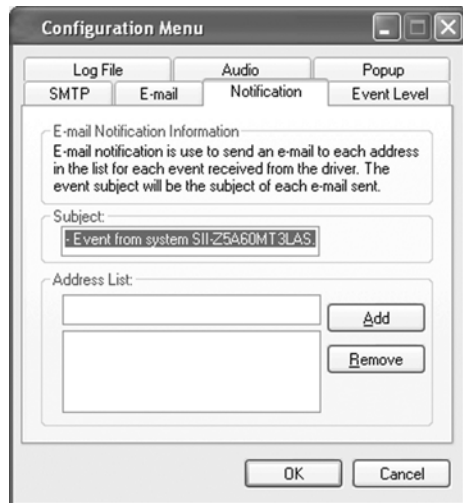
E-Mail

The current SATARaid configuration may be sent via e-mail. Using the e-mail tab in the SATARaid Configuration Menu, the user may set the default e-mail address and subject line to where the configuration would be sent. This, however, can be overridden at the time of sending the email.

Configuration Menu

Log File		Audio		Popup
SMTP	E-mail		Notification	Event Level

E-mail Information

The e-mail address and subject are use when sending the Medley configuration by e-mail. Both can be overriden at the point when the configuration is sent.

E-mail Configuration

E-mail Address: |

E-mail Subject: SilCfg - Configuration information from s

OK   Cancel

Notification

When different types of events occur, SATARaid may be configured to send notices to assigned individual e-mail addresses. Using the Notification tab, all e-mail addresses desired to receive the notices may be entered.

Configuration Menu

Log File		Audio		Popup
SMTP	E-mail		Notification	Event Level

E-mail Notification Information

E-mail notification is use to send an e-mail to each address in the list for each event received from the driver. The event subject will be the subject of each e-mail sent.

Subject:

- Event from system SII-Z5A60MT3LAS.

Address List:

Add

Remove

OK   Cancel

Event Level

There are different types of e-mail notifications that may be sent which are set with the Event Level tab. The different levels are:

Disabled - No event logs will be sent.

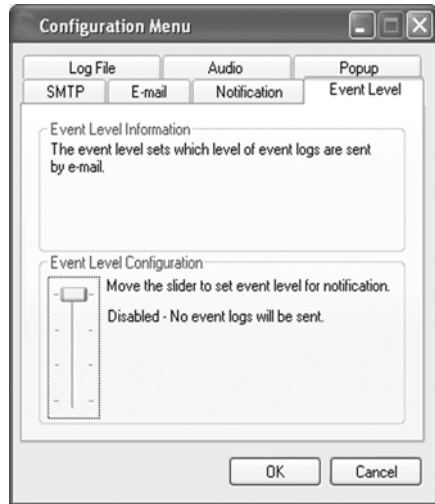Informational - The following events will be sent:
- Informational
- Warnings
- Errors

Warning - The following events will be sent:
- Warnings
- Errors

Errors - The following events will be sent:
- Errors

Log File

The log file is used to store event information received from all the Silicon Image RAID drivers. The log file is a text file and can be viewed with Notepad or SATARaid. Use the Log File tab to set where the log file should be stored and the name of the file as well.

Audio
The user may set different audio alerts for the different levels of events.

Popup
The popup window is a visual notification that an event occurred. The popup window can be disabled or set to popup for only certain event levels. The different levels are:

Disabled - No popup will occur.
Informational - The popup window will be displayed for the following events:
- Informational
- Warnings
- Errors

Warning - The popup window will be displayed for the following events:
- Warnings
- Errors

Errors - The popup window will be displayed for the following events:
- Errors